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Evaluation of a Novel Material for Recycling Tires into Artificial Reefs - Final Report

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EVALUATION OF A NOVEL MATERIAL FOR RECYCLING TIRES INTO ARTIFICIAL REEFS

Final Report

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TABLE OF CONTENTS

SUMMARY

The purpose of this study was to evaluate, from a biological perspective, a tire-concrete aggregate which uses tire shreds mixed into concrete, as a suitable reef building material. Evaluation consisted of comparing the biological assemblages associated with tire-aggregate reefs to standard gravel-concrete reefs of the same design. Four artificial reefs of concrete, tetrahedron modules were placed off Fort Lauderdale, Florida in seven meters of water, two reefs of each type of aggregate. Each reef contains 25 small (1 m/side) and 25 large (1.3 m/side) tetrahedrons stacked in a random configuration. The reefs were monitored at monthly, or less, intervals for 28 months. The status of the biological assemblages were assayed by: visual census (fishes); uw-video taping and collection (invertebrates) and scanning electron microscopy (initial microscopic colonizers). The reefs acquired a diverse assemblage of fishes and invertebrates over the course of the study; 105 species of fishes and over 120 taxa of invertebrates were recorded. There were no apparent significant differences among the biological assemblages, between the two types of reefs, that can be readily ascribed to the difference in construction material. Based on these results, it appears that the tire-concrete aggregate is an appropriate material for artificial reef construction, and may be an ecologically positive method of tire disposal.

1. INTRODUCTION

Artificial reefs are effective fish attractants and important fisheries tools (Bohnsack and Sutherland, 1985). The underlying rational for artificial reefs is that they provide critical habitat that increases abundance and biomass of reef fishes (Bohnsack, 1989). Fish densities, biomass, and sport fishing catch rates can be higher on artificial reefs than on the local natural reefs (Buckley and Hueckel, 1985; Matthew, 1985; Brock and Norris, 1989; Love and Westphal, 1990).

Artificial reefs have been placed in coastal waters around the globe. In Florida more than 600 artificial reefs (Approximately 70 in Broward County alone) have been established to enhance sport fisheries; and new construction is frequent (Pybas, 1991). Construction materials for these reefs have come from diverse sources: old cars and ships to PVC pipe, concrete and discarded automobile and truck tires. A number of studies have investigated the effectiveness of the different materials used in artificial reef construction (Bortone and Van Orman,1985; Chin and Simmons, 1994). Interpretation of these studies depends to a large extent on what aspects of reef function are being examined (i.e. colonization, aggregation, juvenile recruitment, physical stability etc.). In general, however, of the materials widely in use, preformed concrete appears to be among the most successful. In contrast, the use of discarded tires as an effective material for artificial reefs is in some question.

Discarded truck and automobile tires have been used extensively in the past (Bohnsack and Sutherland, 1985; Myatt et.al., 1989; Branden and Reimers, 1994). Tires have some distinct advantages as a construction material for artificial reefs: 1) they are extremely resistant to salt water breakdown 2) they are relatively light and easy to handle compared to some other materials (i.e. concrete) 3) they are abundant and inexpensive (in some areas, including Florida, government bodies will pay for their disposal) 4) artificial reefs offer a convenient, ecologically positive solution to an environmentally sensitive disposal problem. However reefs constructed from tires have had significant problems: 1) often they are unstable, occasionally to the point of being washed ashore (Broward County has had particularly bad experiences in this regard and tire reefs are no longer permitted); 2) the surface of tires is an extremely poor substrate for invertebrate fauna, in some studies corals were recruited to concrete reefs in less than a year yet none were found on the tire reefs even after three years; other invertebrate fauna was also lower on tires than concrete (see Fitzhardinge and Baily-Brock, 1989); (Thus, although a tire reef may function fine as an aggregating device, achieving the goal of a self supporting community is unlikely.) and further 3) in most configurations the tire reefs offer a limited variety of refugal openings, thus limiting diversity.

A new, patented, proprietary material, which may be used under license agreement, has been designed that uses both concrete and tires. Tire chips in place of gravel are mixed with concrete to form a tire-concrete aggregate. Two reefs of this material were placed off Fort Lauderdale, Florida to do a controlled study of the effectiveness of this new material in establishing a productive community.

This is the final report of a three year study to compare the biotic communities that recruit to, or are associated with, reefs composed of the tire-concrete aggregate with those communities that are associated with a standard gravel-concrete aggregate. The rationale for such a study is based, in part, on the possibility that materials may leach from the tire-concrete aggregate that differ from the gravel-concrete aggregate. This material may in turn affect the invertebrate communities and ultimately the fish communities that inhabit the reefs. Our study is designed to examine this possibility. Specifically, we tested the null hypothesis, that the tire-concrete aggregate does not differ from gravel-concrete in the ability over the short term (3 years) to recruit invertebrate and fish assemblages to an artificial reef.

2. MATERIALS AND METHODS

2.1 Construction

The reef modules were constructed and donated to the project by Marin and Marin Inc. and the tire-aggregate patent holder (Benjamin J. Mostkoff). Construction of the reefs consisted of a random stacking of two sizes of tetrahedrons (a four-sided shape, each side with three apexes) that are composed of either standard gravel-concrete aggregate (control reefs) or the proprietary tire-concrete aggregate (experimental reefs).

According to the manufacturer, the tetrahedron shape was selected for module construction for several reasons: 1) they are hydrodynamically slippery, and their extremely stable shape makes them resistant to movement 2) they sink with a minimum of the lateral movement ("sailing") that is typical of other shapes (i.e. concrete pipes) and should therefore stack in a compact reef 3) the random stacked configuration of large and small tetrahedrons offers variable sized openings suitable for a diverse assemblage of fishes.

For the tire-concrete aggregate, shreds of tires (ca. 2-3 square inches each, Photo: 1) were obtained from Tiregon Corporation and used in place of gravel in a concrete aggregate. The tire to concrete ratio can be altered in response to shred size or specific needs. The tire-concrete aggregate, in this study consisted of a mixture of 20 lbs. of tire chips to 104 lbs. of concrete, or 2.3 tires

in a 3 ft. unit, and 5.5 tires in a 4 ft. unit. The concrete aggregates were poured into 3-sided tetrahedron molds and a u-shaped piece of rebar was inserted, to act as a lifting ring. After drying, the modules of different aggregate were similar in appearance with the exception that the tire aggregate modules had tire chips visible at the pouring face.

The study was limited, by the number of modules available, to two replicate reefs of each material. On March 29, 1993 four reefs were deployed in 20 ft of water on sandy substrate off the coast of Broward County in an area permitted to Broward DNRP. The modules were placed on a 40x140 ft. barge (Maritime Tug and Barge Inc.) in four discrete piles and transported to the placement site. On site, the barge was spudded down and the modules were individually forklifted over the side from four marked spots on deck (Photo: 2).

Immediately after deployment DNRP and NOVA personnel examined the reefs. In the water, the modules stacked in piles less then 15 ft. in diameter. The modules stacked in a relatively stable configuration, requiring only minor adjustment by hand or reconfiguration with the aid of an air bag (Photo: 3). In the final configuration the reefs are approximately 6 ft. high, 15 ft in diameter and are separated from each other by 30-50 ft (Photos: 4-7).

Each of the four reefs is composed of 50 modules. Two reefs are composed of a mix of 25 small (3 ft/side) and 25 large (4 ft/side) tire-concrete tetrahedrons each. These two structures function as replicate, experimental reefs (E1, E2). The other two reefs are composed of an identical mix of 25 small and 25 large tetrahedrons. But these two reefs are made of a standard gravel-concrete aggregate and function as replicate controls (C1, C2).

After the reefs were placed in their final configuration, we attached 110 miniature modules to each reef. These miniature modules consisted of tire-concrete or gravel-concrete aggregate cubes (ice cube trays functioned as forms) that were attached to the module lifting rings by plastic cable ties (no more than 3 miniatures per ring). The miniatures were removed at regular intervals for microscopic analysis of initial recruits to the two types of aggregate (see below).

2.2 Monitoring Schedule

Fourteen visits were made to the reefs during the first four and a half months after deployment to monitor the initial colonization. During the second and third grant cycles (September 1993 - August 1995) we monitored the reefs monthly as a minimum with some additional special purpose dives (i.e. night, photography or VIP dives).

2.3 Microorganisms

Three miniature modules from each reef were removed for scanning electron microscope (SEM) analysis at 1,3,5,9,14,22, and 29 days after reef deployment. The SEM technique used to identify the settled microorganisms and to calculate the percent coverage by these organisms followed the methods of Fell and Blackwelder (P. Blackwelder, pers. communication). The miniatures were removed from the reef and placed in gluteraldehyde buffered seawater. The miniatures were then taken through a standard marine fixation including changes in buffer and dehydration in a graded series of alcohols.

After fixation the miniature sections were coated with a thin film of Palladium in a sputter-coater to increase conductivity for SEM examination. To determine percent coverage on these blocks a clear acetate film containing 100 randomly oriented dots was placed on one of the two CRT screens on the SEM. This screen has a constant magnification (400x). A box which magnifies a small portion of this screen 10x is seen on the other CRT screen. Percent coverage was determined by the presence or absence of organisms under the dots. The second screen with its higher magnification allowed for the identification of the organisms seen under the dots at the lower magnification. SEM analysis was discontinued when the community of macroinvertebrates and algae covered 75% or more of the samples (22 days after deployment).

2.4 Sessile invertebrates

Four tetrahedron surfaces, per reef, were chosen to follow the succession of settlement and growth of macro, sessile invertebrates. These surfaces were chosen based on their location on the reef and orientation to the ocean floor. Video taping of each of these surfaces was done at monthly, or shorter, intervals during the first twelve months and quarterly thereafter (Photo: 12). As the study progressed it became apparent that the selected module faces were not representative of the entire invertebrate community. Therefore, a qualitative invertebrate census was initiated in July 1993 and continued biannually through the July 1995. Selected invertebrates were collected (not from videoed surfaces) and taken to the laboratory for identification. Note on identification: we attempted to take all organisms to the lowest readily identifiable taxon. It was not our intent to take each to the lowest known taxon.

2.5 Mobile macroinvertebrate and fish fauna

Fishes and large, mobile macroinvertebrates were censused at monthly intervals or less. Using SCUBA, a single diver circled each reef twice recording species and numbers on a plastic slate (Photo: 16). Fishes, in the water column within 6 ft. of a reef were included in the count. The small size of the individual reefs allowed us to census the entire population rather then using a

timing or transect technique to obtain a representative subsample to extrapolate statistically. A single night dive was made in January 1994 to confirm that our counting methodology was not underestimating nocturnal species

2.6 Statistical analysis

Differences in percent coverage amongst miniature modules was tested by analysis of variance procedures (ANOVA) (Sokal and Rohlf, 1995). A *t*-test for differences in counts was used to examine the differences in total fishes and differences in number of species (Sokal and Rohlf, 1995). Fish diversity was determined by Shannon diversity indices and tested for difference by the Hutcheson *t*-test (Zar, 1989).

3. RESULTS AND DISCUSSION

3.1 Miniature modules

The original colonizers were mainly diatoms and filamentous algae. Within 24 hours post deployment the presence of these microscopic colonizers was recorded. All reefs were 30% covered by organic growth by one week postdeployment and 50% by two weeks. Seventy-five percent, or greater, coverage was achieved by 22 days post deployment (Photos: 8,9,10 and 11; Fig: 1). No qualitative difference in colonizing organisms was apparent between concrete and tire-concrete miniatures. A statistical analysis of percent coverage (all organisms combined) indicated a significant change through time ($P<0.001$ ANOVA) but no statistical differences between replicates or between substrates.

3.2 Invertebrates

Over one hundred and twenty taxa of invertebrates were recorded during the study (Tables: 1-4). Many of these are soft bodied sessile invertebrates, i.e. sponges, ascidians, bryozoans, polychaetes and the like. The invertebrate taxa, recorded in this study, show no preference towards either construction material. No invertebrate was found only on replicates of one material. The first stony coral (Scleractinids) recruits were noted in November, 1993 (nine months after deployment), since that time four coral species have been recorded with at least two species present on all reefs (Photo: 15). All reefs built diverse assemblages of shrimps and crabs. Lobsters are abundant on the reefs when they are out of season, but are rapidly harvested by sport-divers when lobster season opens (Photo: 14). For example, in mid-July, 1994 there were a total of 28 lobsters on the reefs. This number dropped to four one week after the lobster mini-season opened (29 July). A similar decrease in lobsters (30 to 6) was noted in 1995 between the day before and the first morning of mini-season.

Video taping of the reefs highlighted the ephemeral nature of some aspects of the invertebrate assemblage (Photo: 13). For example, in November, 1993 the video faces were densely covered with barnacles, by July of the same year these were much reduced. Some bryozoan colonies apparent in November 1994 were completely absent by July 1994. This type of temporal change would be missed in a qualitative inventory. Further, by video taping, growth can be determined in those organisms that remain over months. Thus, a Faviid hard coral on C-1 grew from 0.5 cm to 2.0 cm in diameter between November, 1993 and July, 1994, and to 2.5 centimeters by March 1995. Regrettably, we did not pick up coral species on any of the other preselected module face that were videoed. Therefore, we have been unable to determine if there are differential growth rates, for specific species, between concrete and tire-concrete substrates. This lack of quantitative data makes it difficult to statistically support or refute a null hypothesis that invertebrates respond similarly to the two types of reef construction material. However, in our qualitative analysis, we did not find any invertebrate species that were unique to either material and this finding does support the null hypothesis.

3.3 Fishes

One hundred and five species of fishes have been recorded since the reefs were deployed. (Tables: 5-16). Fifty-six species were recorded on the reefs during the first grant cycle, 79 species during the second and 77 during this cycle. We continue to record new species regularly; we recorded one, or more, new species each month but four of the last twelve. Thus, we expect the species list to continue to increase during coming months. By six months post-deployment there was an average of 21 species per reef. This value remained relatively constant throughout the remainder of the study, (20 $\pm$2.5, mean $\pm$S.E.) (Figs: 5-8). Total species on all four reefs averaged 37 during this period. Statistically there was no significant difference in the number of species per month between tire or control reef replicates, or between materials when replicates were combined (P>0.05, Difference in Counts Test). In addition, no species appeared to prefer a particular construction material. Although 22 species were recorded only from a single reef type, 16 of these were recorded only once and only from a single reef. The other six species were resident fishes repeatedly recorded from the same reef but not from it's replicate.

Because it was apparent that a single school of juvenile grunts (*Haemulon sp.*) could dramatically affect calculations, all computations and figures dealing with total fishes (all species combined) exclude juvenile grunts. By six months deployment the average total number of fishes per reef was 56. This number varied seasonally with an overall mean of 75 $\pm$16 fishes per reef for the last 22 months of study. Although there was a seasonal variation there is an increasing trend in total numbers of fishes throughout the duration of the study (Figs: 12-15). Thus we anticipate the reefs can, and will, hold a larger number of fishes in

the future. Of the 28 monthly samplings, there are only two months where there was no difference ($P>0.05$) between replicates but there was a significant difference ($P<0.05$) between the materials in total number of fishes. In both cases the tire-concrete reefs held more fish. In view of the remaining analyses, however, we interpret these statistical differences as type I statistical errors rather then a representation of a biological difference.

Shannon diversity indices were computed for each reef for each census date (Tables: 19-21). This index takes into account both number of species as well as number of fish per species. The indices were then compared by paired *t*-tests among the four reefs (Tables: 22-24). The results indicate a number of comparisons that are significant. However, for all but three months of the study there were differences ($P<0.05$) between replicates of one or both materials. Moreover, the differences were not consistent between replicates or between experimental and control reefs. This variation negates any statistical difference noted between experimental and control reefs. Thus, we are unable to refute the null hypothesis that fishes respond similarly to the tire-concrete and gravel-concrete aggregates.

Our study was directed at the biological assemblages associated with the two types of construction materials, no physical parameters (i.e. stability, deterioration rate, etc.) were examined. Our subjective evaluation of the terahedron reefs is, however, very positive. The modules stacked well, in 20 ft of water, with no noticeable sailing. The reefs appear to be extremely stable, we have not noted shifting of any modules during the study period, which included several tropical storms. Nor was there any apparent deterioration of the modules. The reefs are popular with recreational divers. We routinely encountered them in the area and at least one commercial dive operator takes his divers to the reefs for lobstering.

It is of interest to contrast our results to three other, comparable studies in Southeast Florida: one in Palm Beach County one in Monroe County and another in Dade County.

As part of a beach restoration project the City of Boca Raton constructed six offshore reefs in April 1988. A two year environmental monitoring report was done on the project by Coastal Planning and Engineering Inc (1990) and the results were published in a scientific journal (Cummings, 1994). The reefs consisted of stacked limestone boulders, in two layers, on sand covered rock substrate in 8 ft. of water. The individual reefs were approximately 4 ft. high and 14 ft. square. By late June of 1988, they found the number of fish species on all six reefs had reached 31, and this number of species (but not the specific species) remained fairly constant for the duration of the study (28.4 ±5.2). The highest single count recorded was 42 species. The average total number of fishes (all species combined and excluding juvenile grunts) was 112 per reef, however,

excluding a single additional species (Silver porgy, *Diplodus argenteus*) lowered the mean to 67 per reef. A total of 94 fish species was recorded during the study. In Monroe County, off Big Pine Key, a comprehensive artificial reef study, was done by the Florida Keys Artificial Reef Association (Kruer and Causey, 1992). from June 1988 to June 1990. This project examined fish populations, on a bimonthly basis, on artificial and natural reefs at varying depths of water. Relevant to this discussion, due to similarities in water depth and censusing methods, are the results on three, shallow-water prefabricated units placed on sandy substrate in approximately 20 ft of water. The reefs consisted of two overlapping concrete grids at right-angles to one another, each reef approximately 10 x 20 ft and 4 ft high . The average number of species per unit ranged from 10-12 (highest single count 19) and the average number of total fishes 45-49 (highest 89) during the two year study. A total of 67 species were recorded.

NOAA scientists and Florida Sea Grant ran a study from 1987 to 1989 to examine colonization and assemblage structure of fishes on reefs of different sizes. Bohnsack and coworkers (1994) used concrete boxes, with open tops and side holes, as modules to construct 16 reefs off Key Biscayne, Miami. The reefs were constructed in 1987 and monitored monthly for two years. Their three larger, eight module reefs ($14m^2$) are most comparable to the reefs in our study. They found an average of 16 species (maximum 30) and 557 total fishes (including juvenile grunts) per reef.

In contrast to these three studies, after two years total species on our four reefs ranged from 32 to 49 during the year with a mean of 40 (Table 17) (and 39 this year), and an average of 21 species per reef (28 highest single count). The average number of total fishes per reef was 55 for the first 24 months (not including juvenile grunts) (81 excluding the first five months of initial colonization). During the first two years of the study we recorded 97 species.

This is a substantial difference: 23% more species for the four reefs than recorded at Boca Raton and in excess of 24% and 100% more species per individual reef at the Key Biscayne or Big Pine reefs respectively. We also recorded more total species than the Boca Raton or Big Pine studies (not reported for Key Biscayne) and more total fish per reef than the Big Pine units.

The Boca Raton project also recorded invertebrate fauna. They identified 64 invertebrates at two years post-construction. In 28 months we have identified 116 invertebrates (our methodology includes microscopic studies). They recorded a single hard coral. We have noted four species of hard corals.

Obviously, there are many factors among the three studies, apart from reef design, that may account for the substantial differences in vertebrate and invertebrate assemblages. For example, the differences in assemblages may be due to differences in research methodology, depth of water or site location as well as

construction materials and methods. The reason(s) for the discrepancies is worth further investigation given the apparent increased biota attracted to the tetrahedron reefs. However, the comparisons of the results from our study to the other three reported from Southeast Florida indicate, at a minimum, that artificial reefs constructed of tetrahedron modules are extremely effective in acquiring diverse biological assemblages.

In summary, our data supports the null hypothesis that there are no biotic differences in response to the two types of reefs. We conclude, from a biological perspective, tire-concrete aggregate is an acceptable material for artificial reef construction. Artificial reefs constructed of this material may offer a ecologically positive method of recycling waste tires.

4. PUBLIC AWARENESS

Broward DNRP and Nova Southeastern University contacted local news media prior to the deployment of the reefs resulting in excellent local coverage. Both the Sun-Sentinel and Miami Herald reporters were at the deployment and published articles on the work in their respective papers (30 March 1993). Community News reported the project in April (vol. 6: 10). CNN interviewed DNRP and Nova personnel and aired, internationally, a three minute segment on the project, repeatedly, on their Science and Technology section of the news (13-18 April 1993). Underwater News published an article on the project in May 1993 and another in August 1993. Waterway Times published an article on the reefs in their August 1993 issue. The Miami Herald mentioned the reefs in two articles July 1995. Dive Training contained an article on artificial reefs that included a discussion of the tire-concrete project in the August 1995 issue.

Metro-Dade News completed a video presentation on artificial reefs that includes this project in 1994. In spring of 1994 Steve Somerville and Ken Banks from DNRP discussed the project on CNN and BBC, respectively. Richard Spieler was interviewed for a short presentation on artificial reefs by Discovery channel that aired repeatedly in 1994 and 1995. WLRN, channel 17, featured the reefs on Environmental Dimension in 1995. Dr. Spieler made a short presentation of the work to the public and professionals at the Florida Artificial Reef Summit Conference in Tallahassee (5 May 1993). The material presented was published in a proceedings of the meeting. A manuscript has been submitted for publication at the next international artificial reef conference (Tokyo, October 29-November 2, 1995). David Gilliam, a Ph.D. candidate at NOVA will also be presenting results of this study at that meeting. To the best of our knowledge reaction to the project has been singularly positive.

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6. APPENDIX

6.1 List of Photographs I

6.2 List of Tables

6.3 List of Figures

Photo 1: Shredded tire chips used in the tire-aggregate concrete reefs

Photo 2: Forklift deploying individual tetrahedrons from the barge (March 29, 1993).

Photo 3: Movement of individual tetrahedrons into stable positions with an air-bag

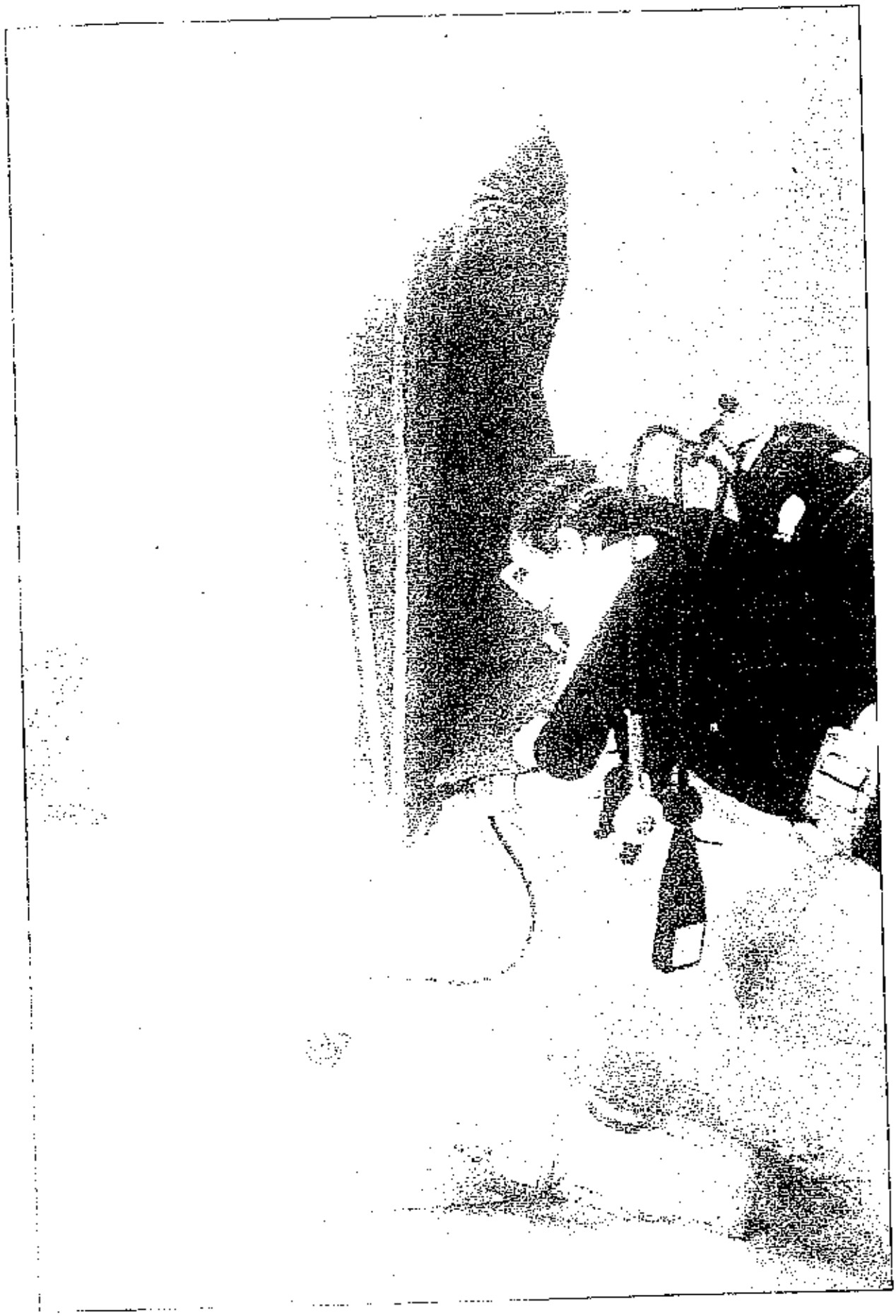


Photo 4: Example of a tire-aggregate reef immediately after deployment.

Photo 5: Example of a tire-aggregate reef immediately after deployment.

Photo 6: Example of a tire-aggregate reef immediately after deployment.

Photo 7: Example of a gravel-aggregate reef immediately after deployment.

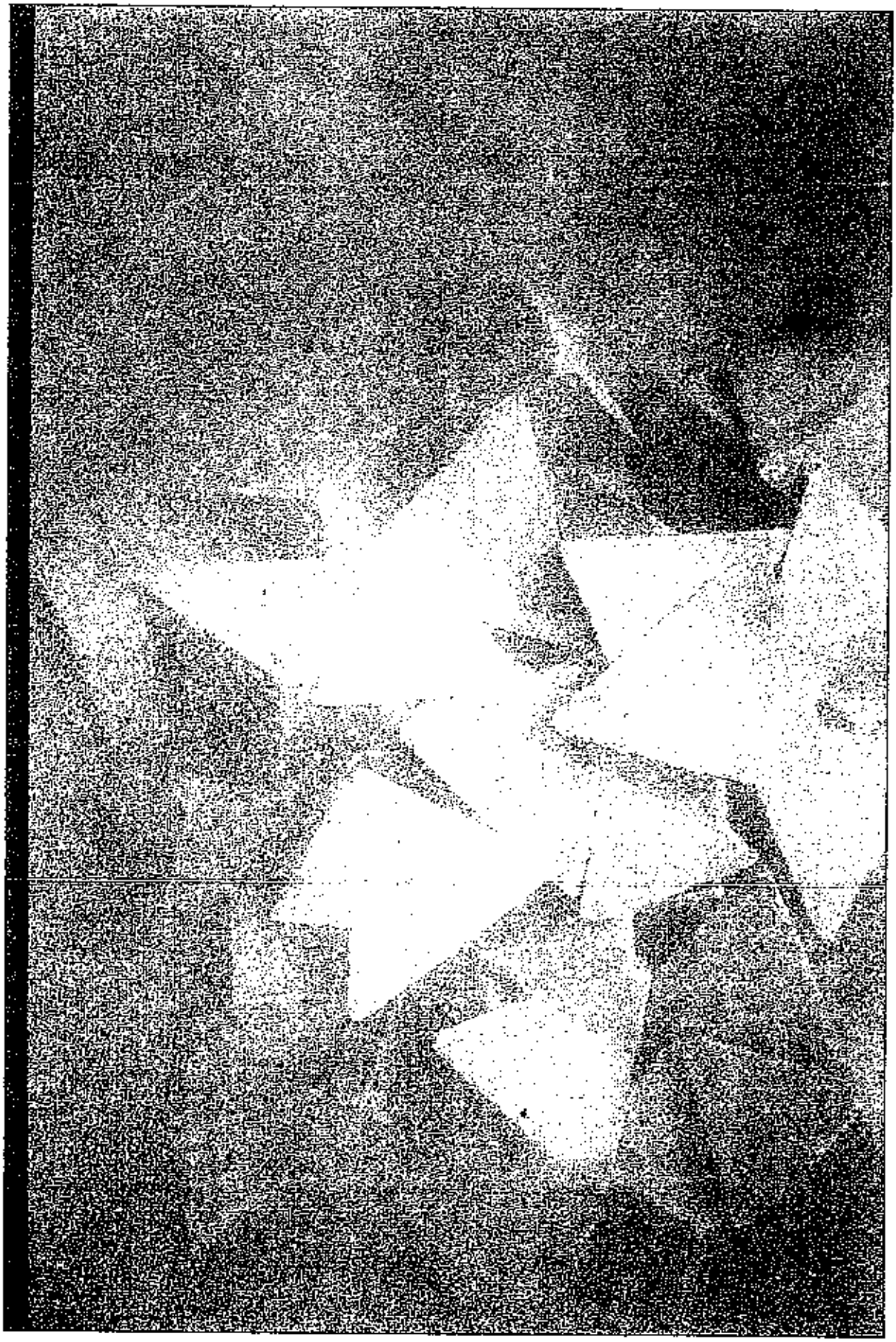
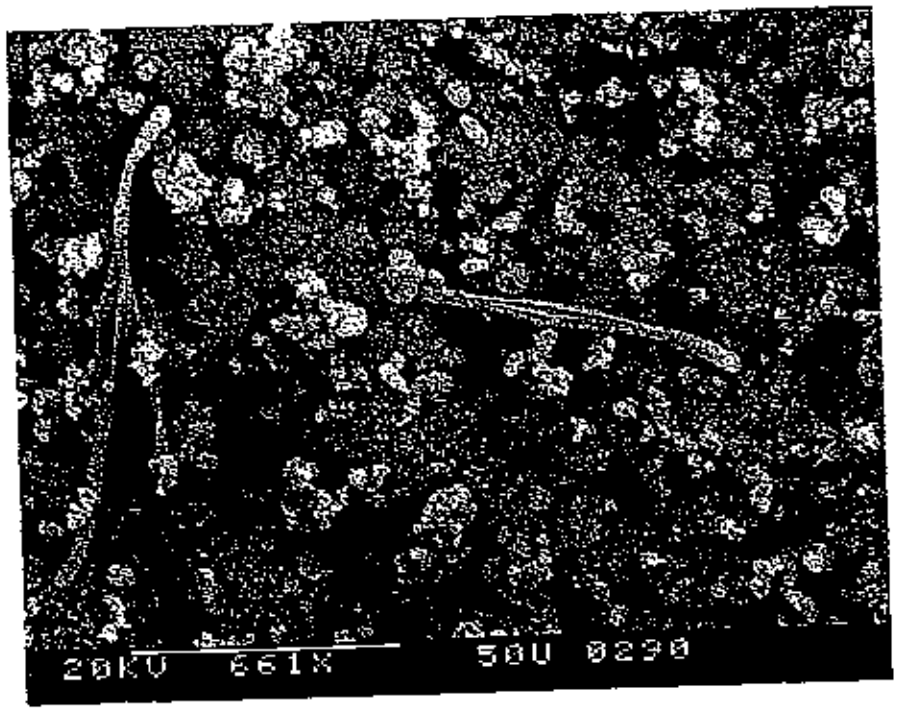


Photo 8: Example of scanning electron microscope images taken from Experimental reef 1, three days after deployment (A), and from Experimental reef 2, 14 days after deployment (B).

A



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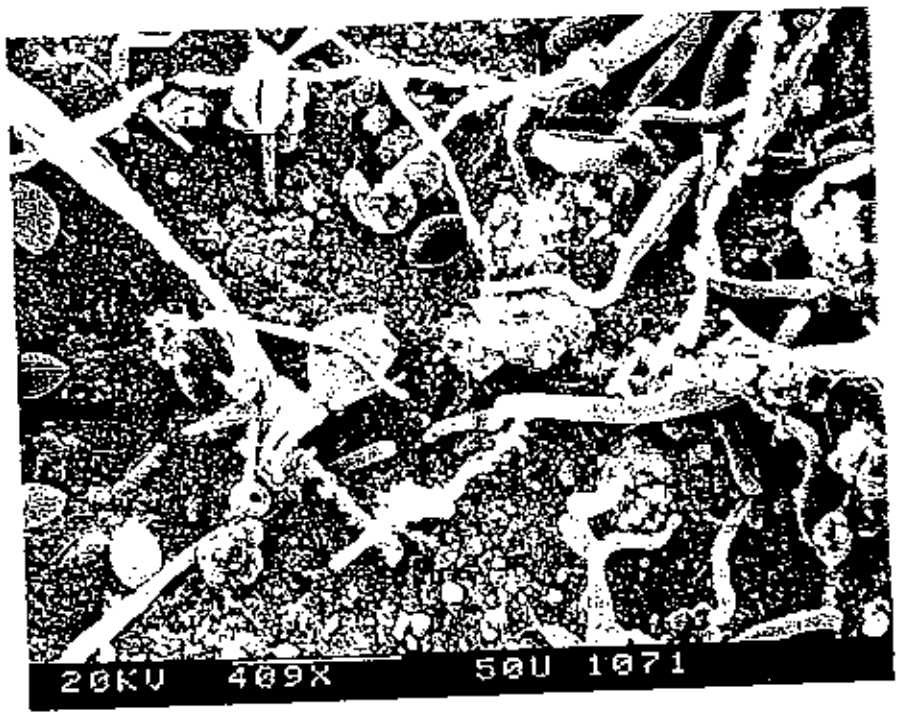
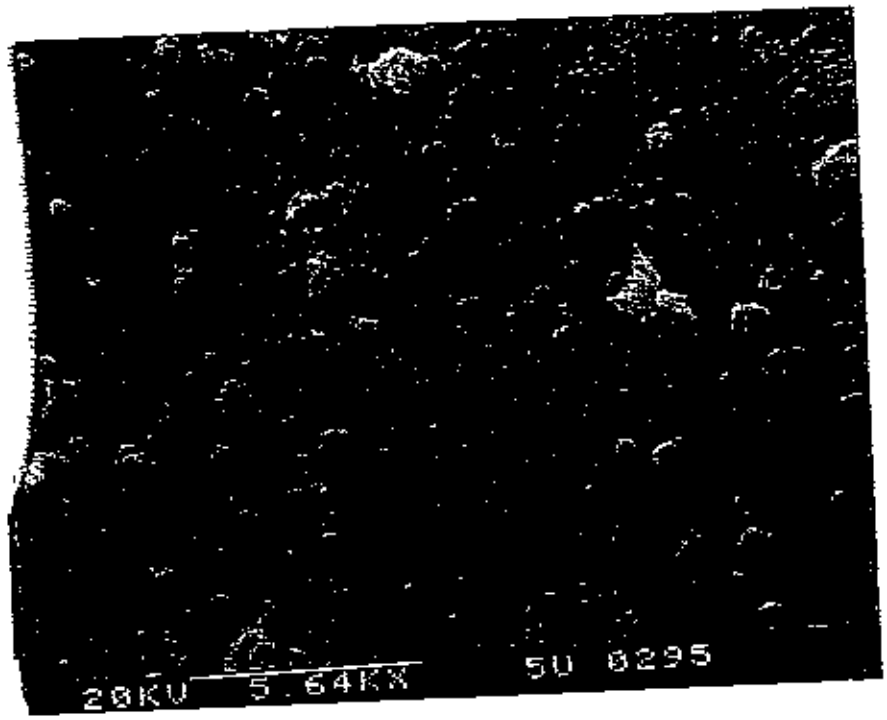


Photo 9: Examples of scanning electron microscope images taken from Control reef 2, one day after deployment (A), and from Control reef 2, nine days after deployment (B).

A



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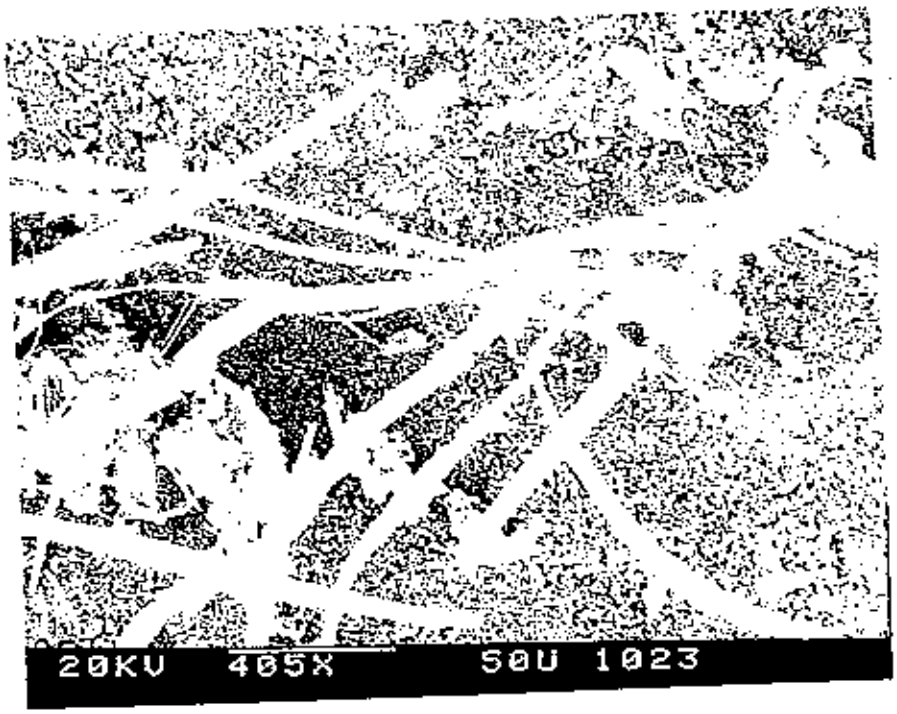
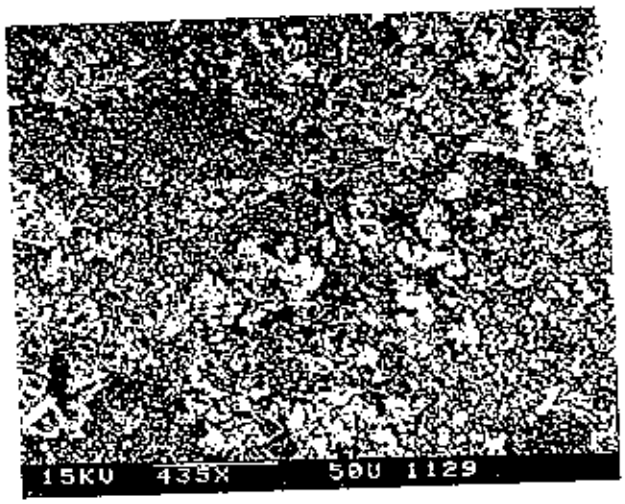
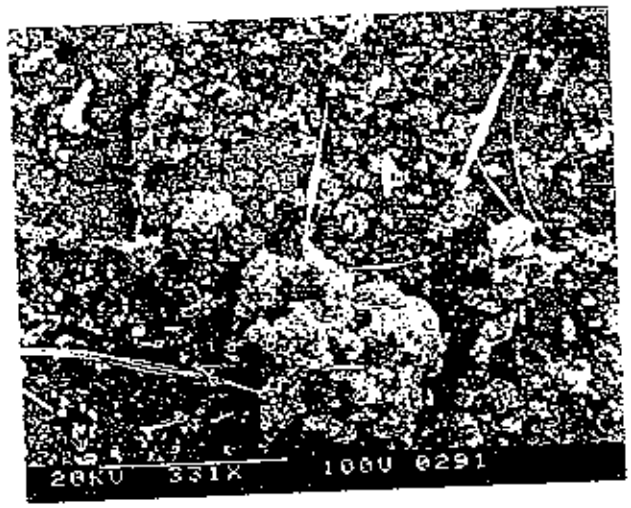


Photo 10: Photomicrographs of miniature modules made of tire-concrete. The numerals in the left hand corner indicate the number of days post-deployment when the miniatures were collected.

1


15KV 435X 50U 1129

3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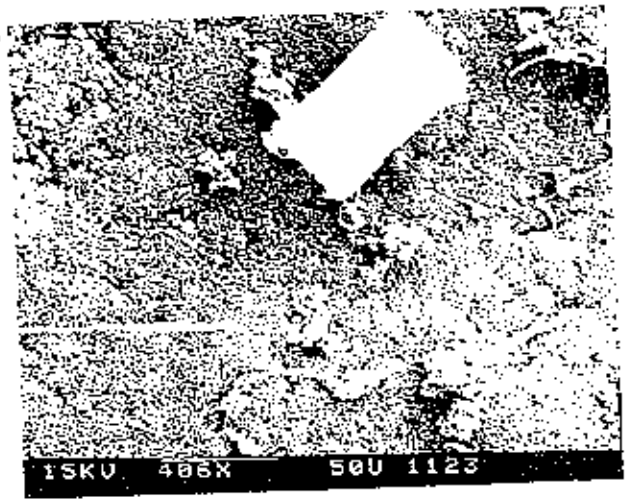
5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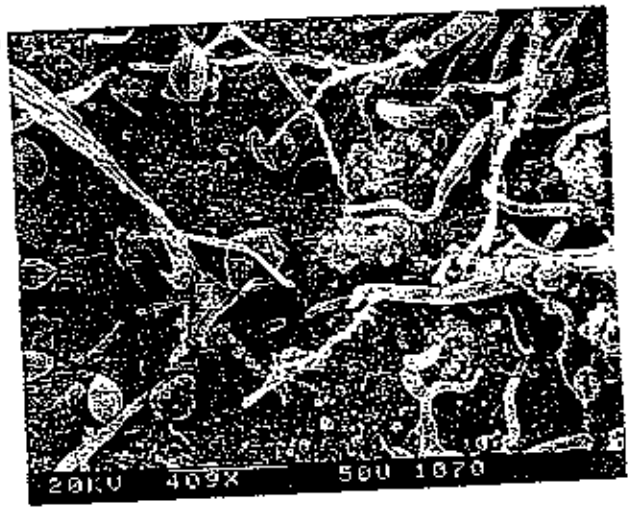
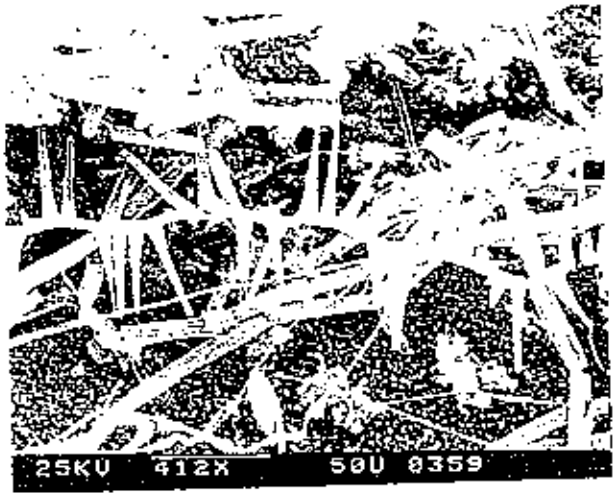
9


20KV 409X 50U 1070

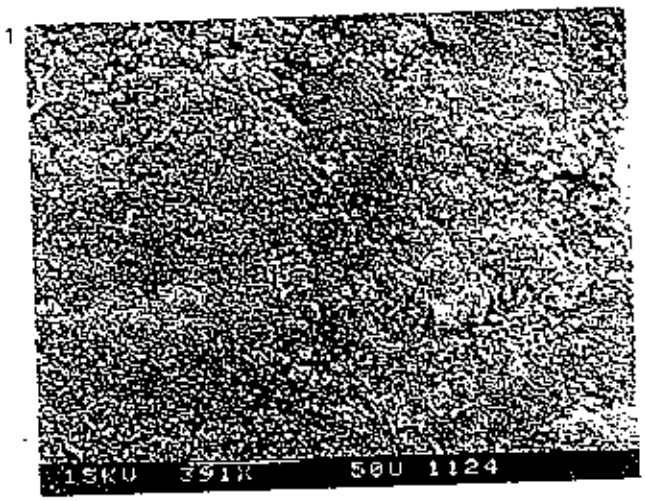
14


25KV 412X 50U 0359

22


15KV 411X 50U 1127

Photo 11: Photomicrographs of miniature modules made of gravel-concrete. The numerals in the left hand corner indicate the number of days post-deployment when the miniatures were collected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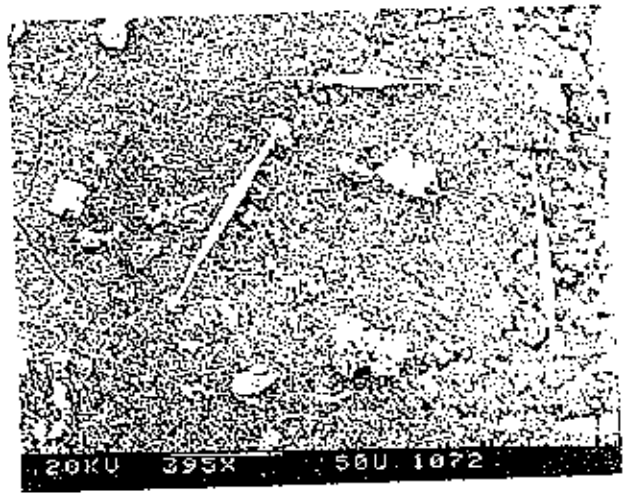
15KV 391X 50U 1124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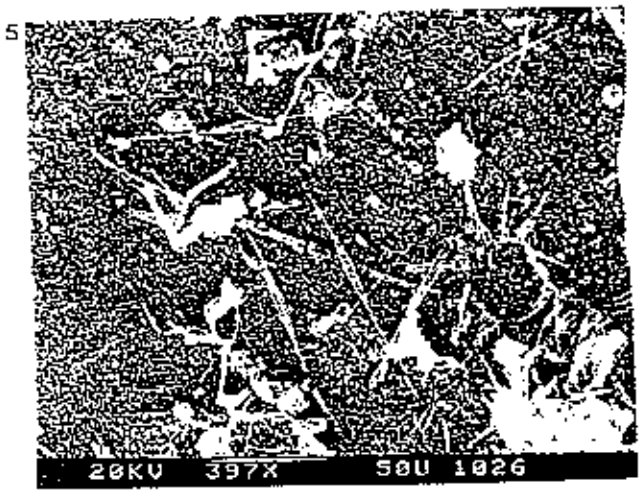
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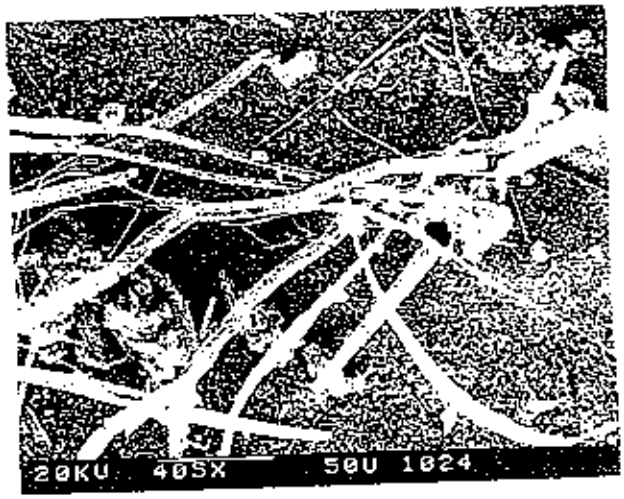
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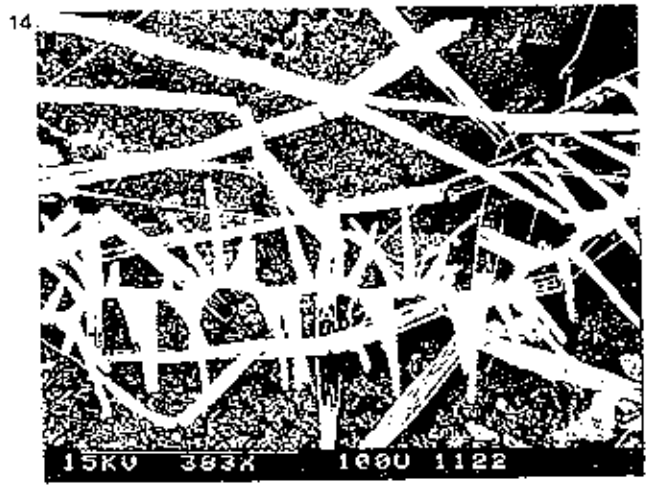
20KV 405X 50U 1024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15KV 383X 100U 1122

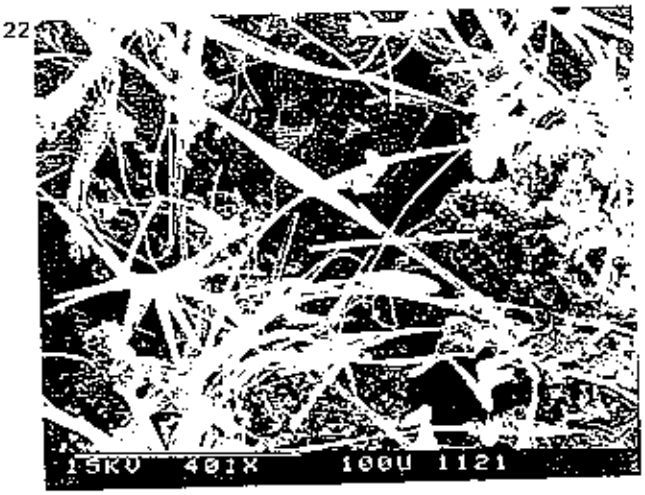
22
15KV 401X 100U 1121

Photo 12: Video-taping of a tetrahedron surface used for monitoring colonization and growth of invertebrates.

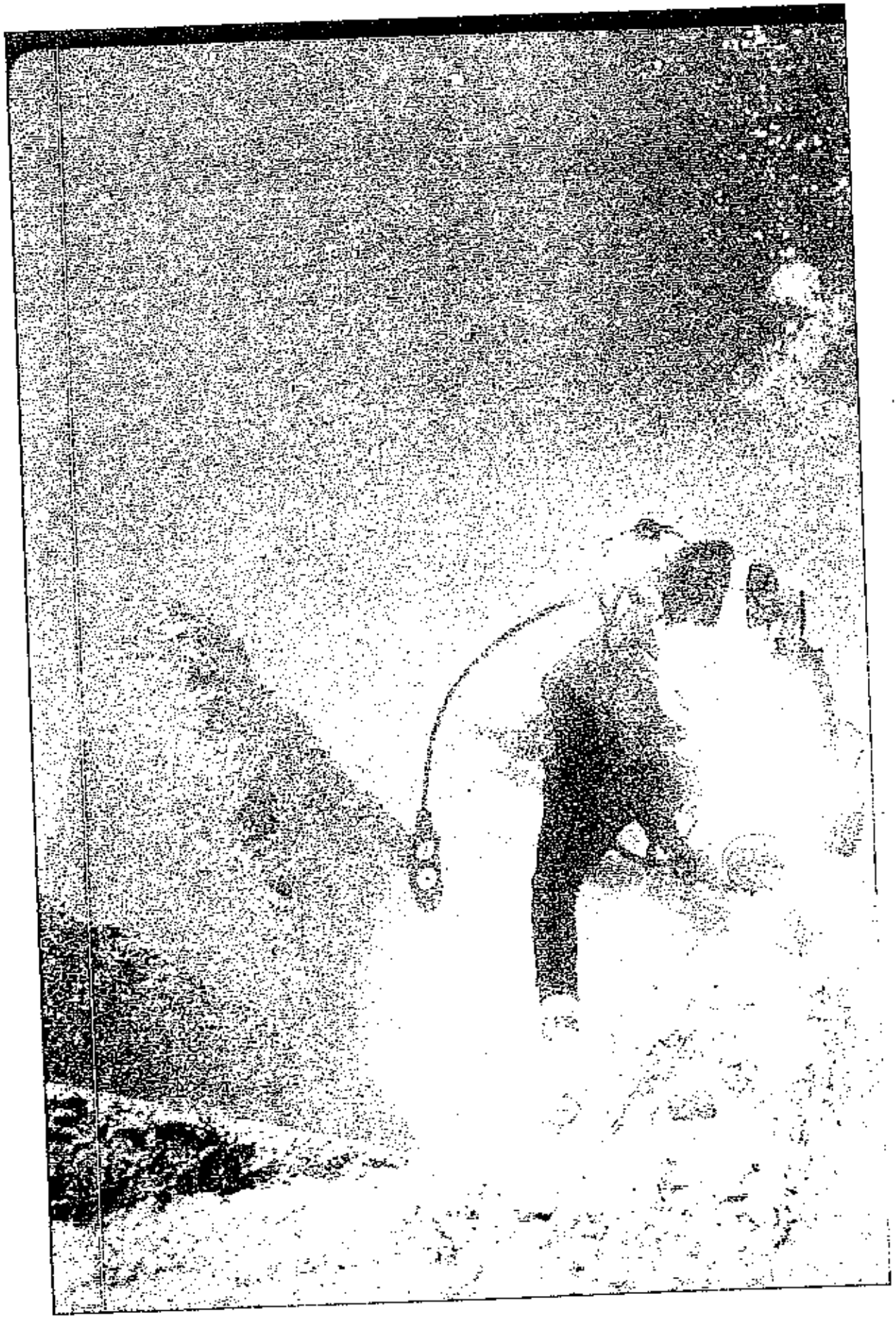

Photo 13: Examples of one monthly sequence of video-taped tetrahedron surfaces from each reef. (Rows of images are of reefs E1, E2, C1 and C2 from top to bottom.)

APRIL 20 1998
JUNE 28 1998
JUL 22 1998
AUG. 6 1998

PHOTO 14: Spiny lobster, *Panularis argus*, on one of the control reefs, July 1995.

PHOTO 15: Coral colony, *Manicina areolata*, growing on reef E2, July 1995.

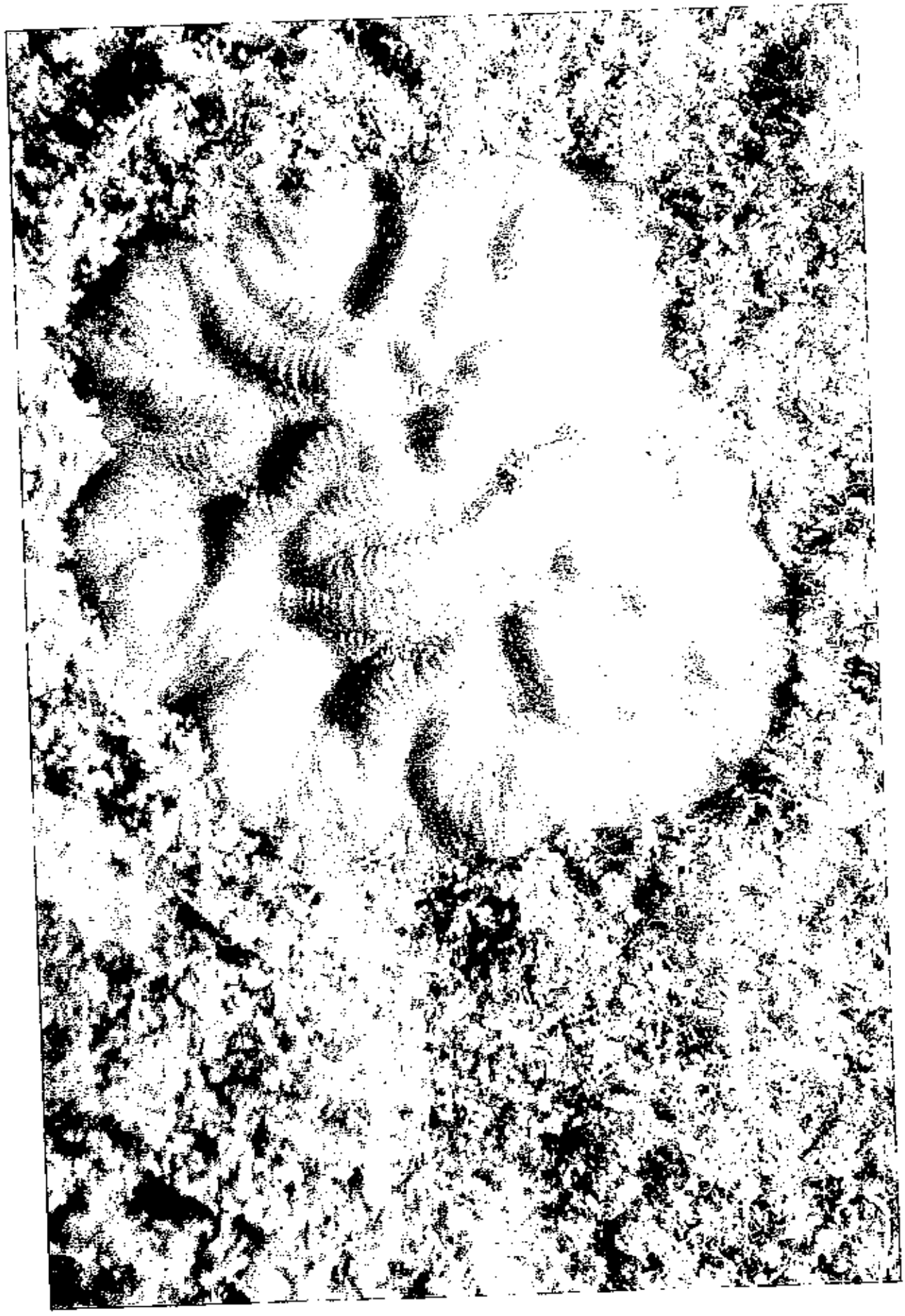

PHOTO 16: Recording fish counts on slates

PHOTO 17: Photograph of a tire-concrete (E1) and some associated biota taken August, 1994

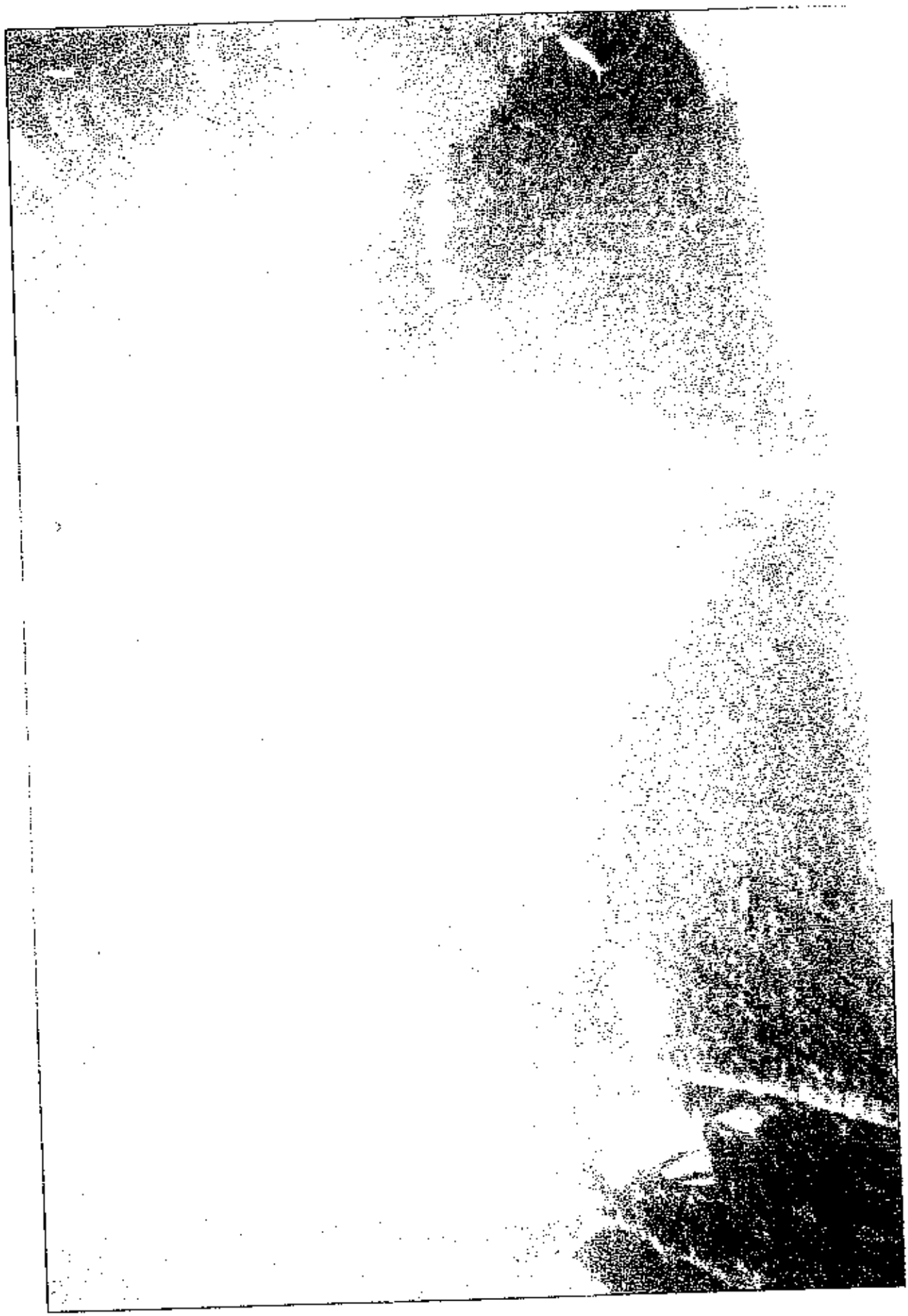

PHOTO 18: Photograph of a tire-concrete reef (E2) and some associated biota taken, August 1994

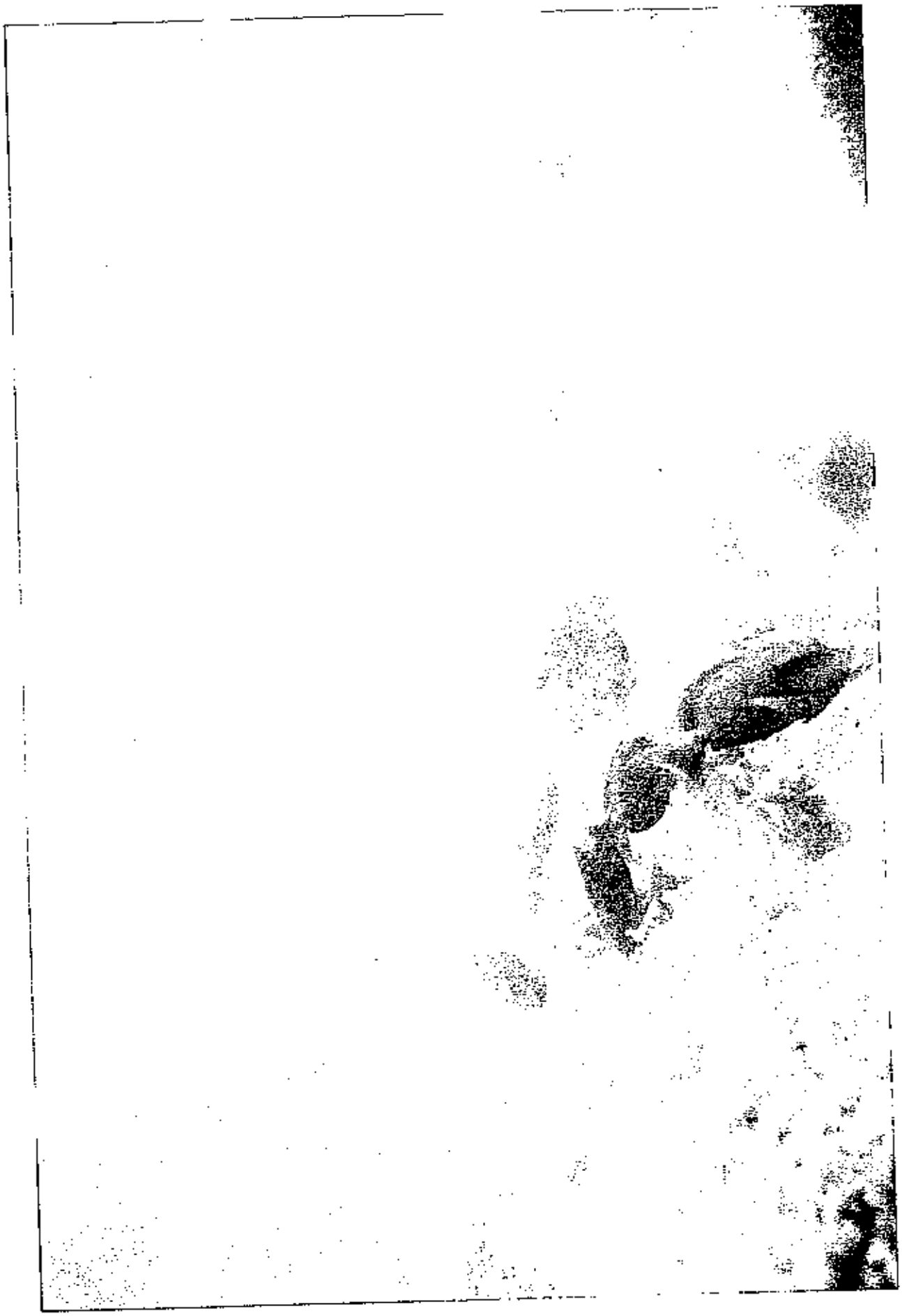

PHOTO 19: Photograph of a tire-concrete reef (C1) and some associated biota taken, August 1994

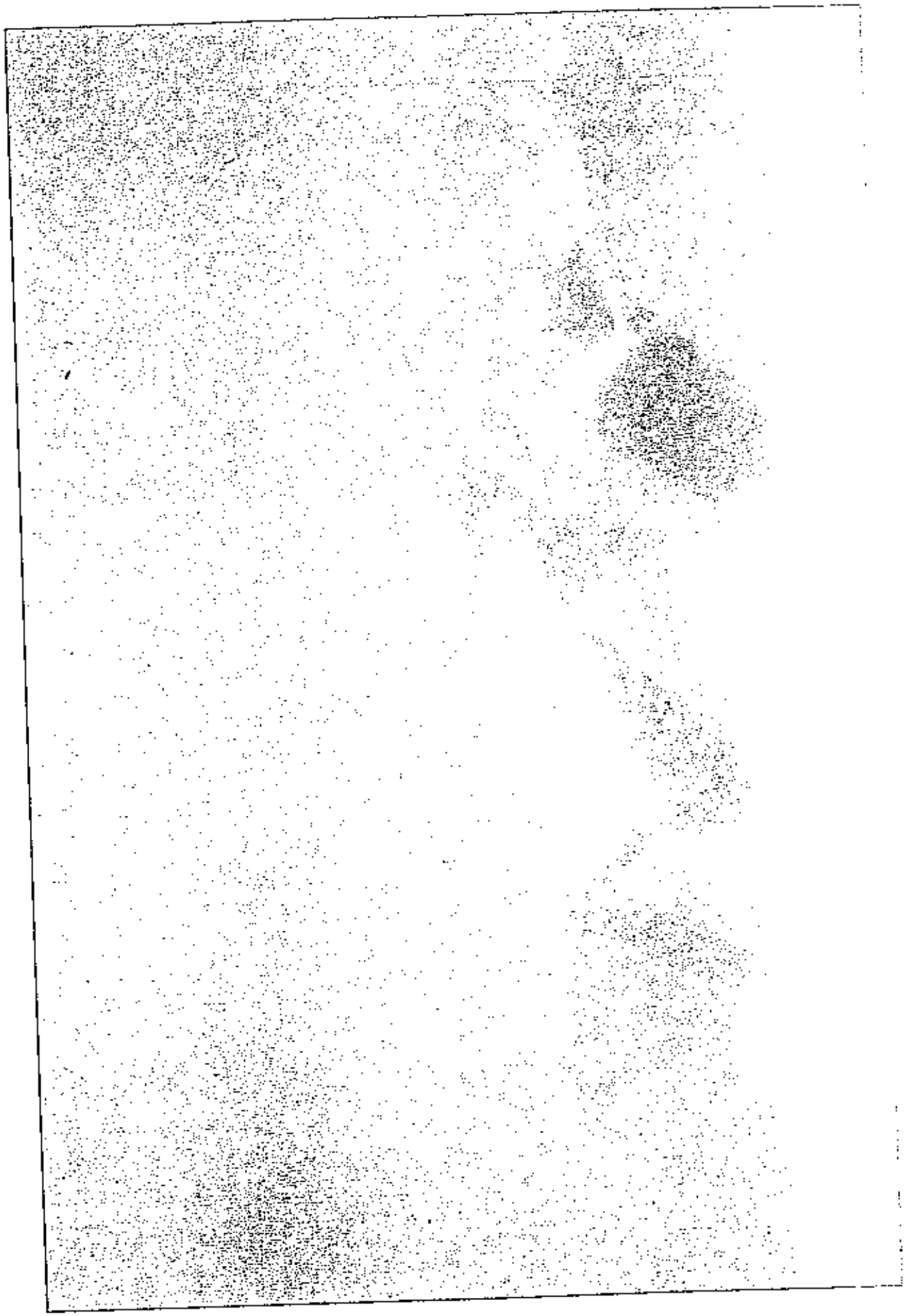

PHOTO 20: Photograph of a tire-concrete reef (C2) and some associated biota taken, August 1994

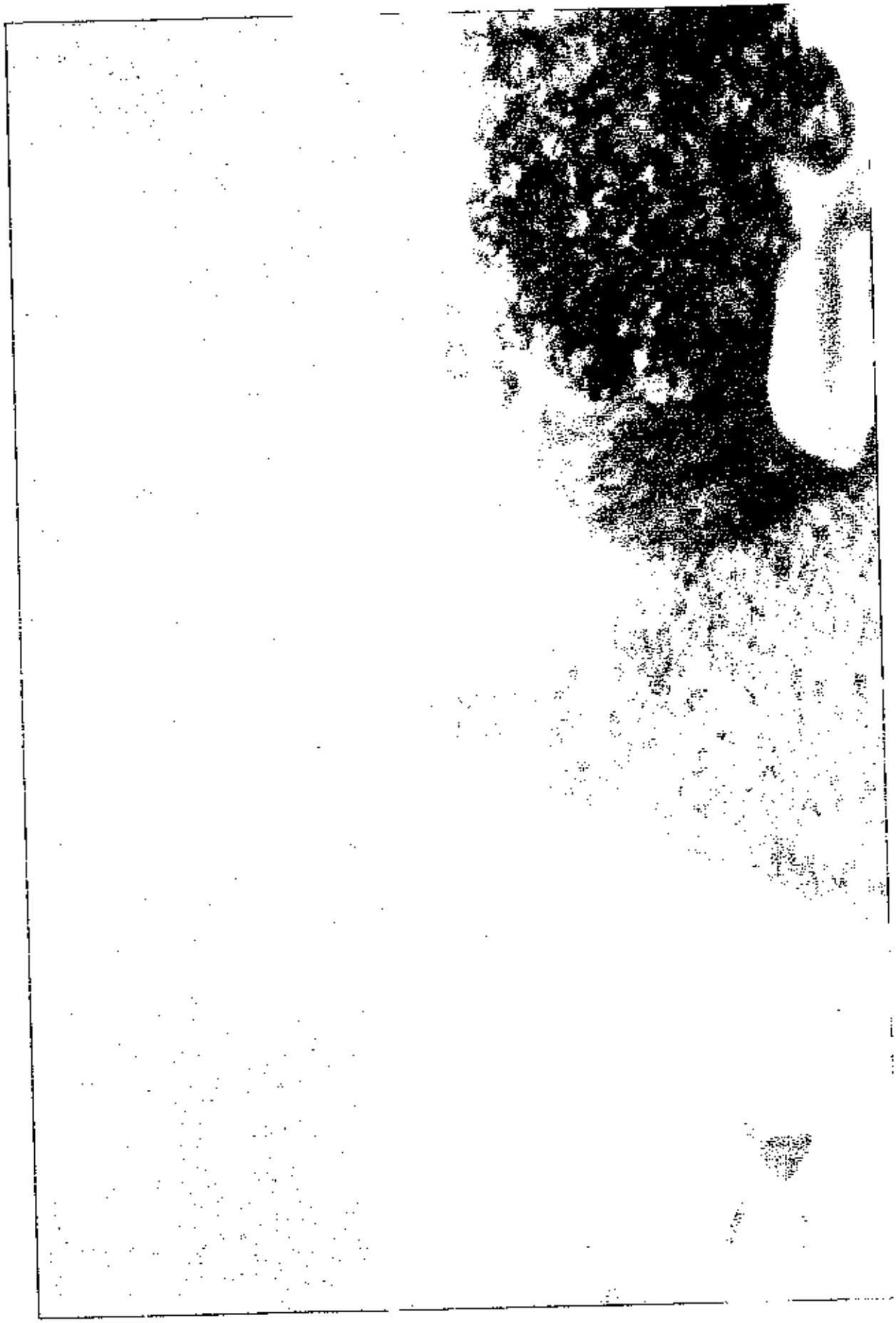

PHOTO 21: Photograph of a red grouper, *Epinephalus morio*, on a control reef , July 1995.

Phylum: Sarcomastigophora
Subphylum: Sarcodina
Order: Faraminiferida
White encrusting foram
White filamentous foram

Phylum: Porifera (Sponges)
Class: Demospongiae
Family: Niphatidae
Amphimedon compressa (Erect rope sponge)
Niphates erecta (Lavender rope sponge)
Family: Stellettidae
Aaptos aaptos
Family: Aplysinidae
Aplysina sp.
Family: Darwinellidae
Ingernella notablis
Family: Desmacidae
Iotrochota birotulata

Phylum: Cnideria
Class: Hydrozoa (Hydroids)
Order: Hydroida
Suborder: Leptomedusae (Thecate hydroid)
Suborder: Anthomedusae (Athecate hydroid)
Class: Anthozoa (Hard and Soft corals)
Order: Alcyonacea
Family: Telestinae
Carijoa riisei (White telesto)
Family: Millorporinidae
Millorporina sp. (Fire Coral)
Order: Gorgonacea
Family: Gordoniidae
Pseudopterogogia acerosa
Pseudopterogorgia bipinnata
Family: Plexauridae
Eunicea succinea
Order: Scleractinia
Family: Faviidae
Manicina arelata (Rose Coral)
Solenastrea bournoni (Smooth Star Coral)
Family: Meandrinidae
Dichocoenia stokesii

Phylum: Annelida (Segmented worms)
Class: Polychaeta
Family: Amphinomidae
Hermodice carunculata (Bristle Worm)

Table 1: List of invertebrates identified on Control Reef I

Family: Eunicidae
Family: Filogranidae
Filograna huxleyi (Sea frost)
Family: Polynoidae (Scale Worms)
Family: Nereidae
Family: Sabellidae
Family: Serpulidae
Family: Syllidae
Family: Terebellidae
Family: Polynoidae

Phylum: Arthropoda
Subphylum: Crustacea
Class: Maxillopoda
Subclass: Cirripedia (Barnacles)
Family: Balinidae
Balanus amphitrite
Balanus trigonus
Class: Malacostaca
Order: Decapoda
Family: Alpheidae (Snapping shrimp)
Synalpheus sp.
Red Snapping Shrimp
Family: Rhynchocinetidae
Rhynchocinetes rigens (Red Night Shrimp)
Family: Palaemonida
Brachycarpus biunguicalatus (Two Claw Shrimp)
Family: Stenopodidea
Stenopus hispidus (Coral Banded shrimp)
Family: Diogenidae (Hermit crab)
Family: Palinuridae
Panulirus argus (Spiny lobster)
Family: Majidae (Clinging crabs)
Mithrax hispidus
Mithrax sp.
Stenorhynchus seticornis (Arrow crab)
Family: Porcellanidae
Petrolisthes galathinus (Porcellan Crab)
Order: Stomatopoda (Mantis Shrimp)
Order: Amphipoda
Order: Isopoda
Order: Tanaidacea
Order: Mysidacea
Class: Pycnogonida (Sea spiders)

Phylum: Mollusca
Class: Gastropoda
Subclass: Prosobranchia
Order: Mesogastropoda
Family: Crepidulinae
Crepidula aculeata (Slipper shell)

Table 1: Continued

Family: Cerithiidae
Cerithium litteratum (Stocky cerith)
Family: Cymatiidae
Cymatium pileare (Atlantic Hairy Triton)
Family: Cypraeidae
Cypraea cervus (Atlantic Deer Cowrie)
Family: Fissurellidae
Puncturella sp. (Limpet)
Family: Murcidae
Murex pomum (Apple Murex)
Family: Purpurinae
Thais sp. (Rock Shell)
Family: Triphora
Triphora sp.

Subclass: Opistobranchia
Order: Nudibranchia
Family: Chromodoridae
Hypselodoris edenticulata (Fl. Regal Sea Goddess)

Class: Bivalvia
Family: Arcidae
Arca zebra (Turkey Wing)
Family: Cardiidae
Papyridea semisulcata (Frilled Paper Cockle)
Family: Chamidae
Chama macerophylla (Leafy Jewel Box)
Family: Mytilidae (Mussels)
Musculus lateralis
Family: Pteriidae (Wing oysters)
Pinctada imbricata
Family: Pectinidae
Chlamys sentis (Sentis Scallop)
Family: Ostreidae (Oyster)
Lopha frons
Ostrea permollis (Sponge Oyster)
Family: Spondylidae
Spondylus sp. (Thorny Oyster)

Class: Polyplacophora (Chitons)
Family: Chaetopleuridae
Chaetopleura apiculata

Phylum: Ectoprocta (Brozoans)
Class: Gymnolaemata
Order: Cheilostomata
Family: Bugulidae
Bugula sp.
Family: Cheiloporinidae
Waterspipora subovoidae
Family: Smittinidae
Parasmittina sp.
Steginoporella magnilabris
Unidentified blood Red Bryozoan

Table 1: Continued

Order: Ctenostomata
Family: Alcyonidiisae
Alcyonidium sp.
Unidentified green encrusting bryozoan
Unidentified orange encrusting bryozoan

Phylum: Echinodermata
Class: Ophiuroidae
Order: Ophiurae (Brittle stars)
Class: Echinoidea
Family: Diadematidae
Diadema antillarum (Long-Spinned Urchin)
Family: Echinidae
Tripneustes ventricosus (Sea Egg)
Family: Cidaridae
Eucidaris tribuloides (Pencil Urchin)
Family: Toxopneustidae
Lytechinus variegatus (Variegated Urchin)
Class: Holothuroidea (Sea Cucumber)

Phylum: Chordata
Class: Ascidiacea (Tunicates)
Order: Enterogona
Family: Ascidiidae
Ascidia nigra
Family: Clavelinidae
Clavelina sp.
Family: Didemnidae
Order: Pleurogona
Family: Molgulidae
Molgula sp.
Family: Pyuridae
Pyrura vitia
Family: Styelidae
Styela plicata
Symplegma viride
Polycarpa spongiabilis
Unidentified orange colonial ascidian
Unidentified red colonial ascidian
Unidentified grey colonial ascidian
Unidentified solitary ascidian

Table 1: Continued

Phylum: Sarcomastigophora
Subphylum: Sarcodina
Order: Faraminiferida
White encrusting foram
White filamentous foram

Phylum: Porifera (Sponges)
Class: Demospongiae
Family: Aplysinellidae
Aplysina fulva
Pseudoceratina crassa (Branching tube sponge)
Family: Niphatidae
Amphimedon compressa (Erect rope sponge)
Niphates erecta (Lavender rope sponge)
Family: Clionidae
Cliona sp.
Family: Mycalidae
Mycale sp.
Family: Desmacidae
Iotrochota birotulata
Unidentified orange encrusting sponge
Unidentified grey encrusting sponge
Unidentified black encrusting sponge

Phylum: Cnideria
Class: Hydrozoa (Hydroids)
Order: Hydroida
Suborder: Leptomedusae (Thecate hydroid)
Suborder: Anthomedusae (Athecate hydroid)
Class: Anthozoa (Hard and Soft corals)
Order: Alcyonacea
Family: Telestinae
Carijoa riisei (White telesto)
Family: Millorporinidae
Millorproina sp. (Fire Coral)
Order: Gorgonacae (Gorgonians)
Family: Plexauridae
Plexorella sp.
Family: Gorgoniidae
Pseudopterogorgia acerosa
Pseudopterogorgia bipinnata (Sea Whip)
Order: Scleractinia
Family: Faviidae
Manicina aerolata (Rose Coral)
Solenastrea bournoni (Smooth Starlet Coral)
Family: Siderastreidae
Siderastrea radians (lesser Starlet Coral)

Table 2: List of invertebrates identified on Control Reef 2.

Phylum: Annelida (Segmented worms)
- Class: Polychaeta
  - Family: Eunicidae
  - Family: Filogranidae
    - *Filograna huxleyi* (Sea frost)
  - Family: Nereidae
  - Family: Sabellidae
  - Family: Serpulidae
  - Family: Syllidae
  - Family: Terebellidae
  - Family: Amphinomidae
    - *Hermodice carunculata* (Bristle Worm)

Phylum: Arthropoda
- Subphylum: Crustacea
  - Class: Maxillopoda
    - Subclass: Cirripedia (Barnacles)
      - Family: Balinidae
        - *Balanus amphitrite*
        - *Balanus trigonus*
  - Class: Malacostaca
    - Order: Decapoda
      - Family: Alpheidae
        - *Synalpheus sp.*
        - Red Snapping Shrimp
      - Family: Rhynchocinetidae
        - *Rhynchocinetes rigens* (Red Night Shrimp)
      - Family: Bresiliida
        - *Discias atlanticus*
      - Family: Stenopodidea
        - *Stenopus hispidus* (Coral Banded shrimp)
      - Family: Diogenidae (Hermit crab)
      - Family: Palaemonidae
        - *Brachycarpus biunguicalatus* (Two Claw Shrimp)
      - Family: Palinuridae
        - *Panulirus argus* (Spiny lobster)
      - Family: Majidae
        - *Mithrax cinctimanus* (Clinging crab)
        - *Mithrax holderi*
        - *Mithrax sp.*
        - *Stenorhynchus seticornis* (Arrow crab)
      - Family: Porcellanidae
        - *Petrolisthes galathirus* (Porcellian Crab)
    - Order: Amphipoda
    - Order: Isopoda
    - Order: Tanaidacea
    - Order: Mysidacea

Table 2: Continued

Phylum: Mollusca
- Class: Gastropoda
  - Family: Cerithiidae
    - *Cerithium litteratum* (Stocky cerith)
  - Family: Purpinae
    - *Thais rustica* (Rustic Rock Shell)
- Class: Bivalvia
  - Family: Arcidae
    - *Barbatia domingensis* (White Miniature Ark)
  - Family: Cardiidae
    - *Papyridea semisulcata* (Frilled Paper Cockle)
  - Family: Chamidae
    - *Chama macerophylla* (Leafy Jewel Box)
  - Family: Limidae
    - *Lima lima* (Spiny Lima)
    - *Lima scabra* (Rough Lima)
  - Family: Mytilidae (Mussels)
    - *Musculus lateralis*
    - *Modiolus americanus* (Tulip mussel)
  - Family: Pteriidae (Wing oysters)
    - *Pinctada imbricata*
  - Family: Ostreidae (Oyster)
    - *Lopha frons*
    - *Ostrea permollis* (Sponge oyster)
  - Family: Spondylidae
    - *Spondylus sp.* (Thorny Oyster)

Phylum: Ectoprocta (Brozoans)
- Class: Gymnolaemata
  - Order: Cheilostomata
    - Family: Membraniporidae
      - *Membranipora sp.*
    - Unidentified green encrusting bryozoan
    - Unidentified orange encrusting bryozoan
    - Unidentified brown encrusting bryozoan
    - Unidentified blood red encrusting bryozoan

Phylum: Echinodermata
- Class: Ophiuroidae
  - Order: Ophiurae (Brittle stars)
- Class: Echinodea
  - Family: Diadematidae
    - *Diadema antillarum* (Longspinned Sea Urchin)
  - Family: Cidaridae
    - *Eucidaris tribuloides* (Pencil Urchin)

Table 2: Continued

Phylum: Chordata
Class: Ascidiacea (Tunicates)
Order: Enterogona
Family: Ascidiidae
Ascidia nigra
Family: Didemnidae
Order: Pleurogona
Family: Molgulidae
Molgula sp.
Family: Pyuridae
Pyrura vitta
Family: Styelidae
Symplegma viride
Unidentified orange colonial ascidian
Unidentified red colonial ascidian
Unidentified grey colonial ascidian
Unidentified solitary ascidian

Table 2: Continued

Phylum: Sarcomastigophora
Subphylum: Sarcodina
Order: Faraminiferida
White encrusting foram
White filamentous foram

Phylum: Porifera (Sponges)
Class: Demospongiae
Family: Agelasidae
Agelas sceptrum
Family: Aplysinidae
Aplysina fulva.
Family: Niphatidae
Amphimedon compressa (Erect rope sponge)
Niphates erecta (Lavender rope sponge)
Family: Desmacidae
Iotrochota birotulata
Unidentified orange encrusting sponge
Unidentified gr ey encrusting sponge
Unidentified black encrusting sponge
Unidentified blue sponge

Phylum: Cnideria
Class: Hydrozoa (Hydroids)
Order: Hydroida
Suborder: Leptomedusae (Thecate hydroid)
Thyrosyphus ramosus (Algae Hydroid)
Suborder: Anthomedusae (Athecate hydroid)
Halocordyle disticha! (Christmas Tree Hydroid)
Class: Anthozoa (Hard and Soft corals)
Order: Alcyonacea
Family: Telestinae
Carijoa riisei (White telesto)
Family: Millorporinidae
Millorporina sp. (Fire Coral)
Order: Gorgonacae (Gorgonians)
Family: Plexauridae
Eunicea caliculata
Psuedoplexora sp.
Family: Gorgoniidae
Pseudopterorgia acerosa
Pseudopterorgia bipinnata (Sea Whip)
Order: Scleractinia
Family: Faviidae
Manicina areolata (Rose Coral)
Solenastrea bournoni (Smooth Star Coral)
Family: Siderastreidae
Siderstrea sidera (Massive Starlet Coral)

Table 3: List of invertebrates identified on Experimental Reef 1.

Phylum: Annelida (Segmented worms)
Class: Polychaeta
Family: Amphinomidae
Hermodice carunculata (Bristle worm)
Family: Eunicidae
Family: Filogranidae
Filograna huxleyi (Sea frost)
Family: Nereidae
Family: Polynoidae (Scale Worms)
Family: Onuphidae
Family: Sabellidae (Featherduster worm)
Family: Serpulidae
Family: Syllidae
Family: Terebellidae

Phylum: Arthropoda
Subphylum: Crustacea
Class: Maxillopoda
Subclass: Cirripedia (Barnacles)
Family: Balinidae
Balanus amphitrite
Balanus trigonus

Class: Malacostaca
Order: Decapoda
Family: Diogenidae (Hermit crab)
Family: Rhynchocinetidae
Rhynchocinetes rigens (Red Night Shrimp)
Family: Grapsidae
Percnon gibbesi (Nimble spray crab)
Family: Majidae
Mithrax sp. (Clinging crab)
Mithrax hispidus
Macrocoeloma sp.
Stenorhynchus seticornis (Arrow crab)
Family: Palinuridae
Panulirus argus (Spiny lobster)
Family: Processidae
Processa sp.
Family: Stenopodidea
Stenopus hispidus (Coral Banded shrimp)
Family: Porcellanidae
Petrolisthes galathirus (Porcellain Crab)
Family: Xanthidae
Pilumus sp.
Order: Amphipoda
Order: Isopoda
Order: Tanaidacea

Table 3: Continued

Phylum: Mollusca
- Class: Gastropoda
  - Subclass: Prosobranchia
    - Order: Mesogastropoda
      - Family: Cerithiidae
        - *Cerithium litteratum* (Stocky cerith)
      - Family: Crepidulinae
        - *Crepidula aculeata* (Spiny slipper shell)
      - Family: Cymatiidae
        - *Cymantium pileare* (Atlantic Hairy Triton)
      - Family: Diodora
        - *Diodora dysoni* (Dyson's Keyhole Limpet)
      - Family: Purinae
        - *Thais rustica* (Rustic Rock Shell)
  - Subclass: Opistobranchia
    - Order: Nudibranchia
  - Class: Bivalvia
    - Family: Arcidae
      - *Barbatia cancellaria* (Redbrown Ark)
    - Family: Limidae
      - *Lima lima* (Spiny Lima)
      - *Lima scabra* (Rough Lima)
    - Family: Mytilidae (Mussels)
      - *Musculus lateralis*
      - *Musculus sp.*
    - Family: Pteriidae (Wing oysters)
      - *Pinctada imbricata* (Atlantic Pearl Oyster)
      - *Lopha Frons*
    - Family: Ostreidae (Oyster)
      - *Ostrea permallis* (Sponge oyster)
    - Family: Limidae
      - *Lima scraba* (Flame Scallop)
    - Family: Chamidae
      - *Chama maerophylla* (Leafy Jewel Box)

Phylum: Ectoprocta (Brozoans)
- Class: Gymnolaemata
  - Order: Cheilostomata
    - Family: Cheiloporinidae
      - *Watersipora subovoidea*
    - Family: Schizoporellidae
      - *Stylopoma spongites*
    - Family: Smittinidae
      - *Parasmittina sp.*
  - Unidentified green encrusting bryozoan
  - Unidentified orange encrusting bryozoan
  - Unidentified brown encrusting bryozoan
  - Order: Cyclostomata
    - Family:Crisiidae
      - *Crisia eburnea*

Table 3: Continued

Phylum: Echinodermata
- Class: Ophiuroidae
  - Order: Ophiurae (Brittle stars)
- Class: Echinoidea
  - Family: Cidarida
    - *Eucidaris tribuloides* (Pencil Urchin)
  - Family: Diadematidae
    - *Diadema antillarum* (Longspinned Urchin)

Phylum: Chordata
- Class: Ascidiacea (Tunicates)
  - Order: Enterogona
    - Family: Ascidiidae
      - *Ascidia nigra*
      - *Ascidia sp.*
    - Family: Didemnidae
  - Order: Pleurogona
    - Family: Molgulidae
      - *Molgula sp.*
    - Family: Pyuridae
      - *Pyrura vitta*
    - Family: Styelidae
      - *Symplegma viride*
  - Unidentified orange colonial ascidian
  - Unidentified red colonial ascidian
  - Unidentified grey colonial ascidian
  - Unidentified solitary ascidian

Table 3: Continued

Phylum: Sarcomastigophora
Subphylum: Sarcodina
Order: Faraminiferida
White encrusting foram
White filamentous foram

Phylum: Porifera (Sponges)
Class: Demospongiae
Family: Aplysinidae
Aplysina sp.
Family: Desmacidae
Iotrochota birotulata (Green finger sponge)
Family: Niphatidae
Amphimedon compressa (Erect rope sponge)
Niphates erecta (Lavender rope sponge)
Family: Raspailiidae
Echinodictyum pennatum
Family: Myxillidae
Tedania ignis
Family: Thorectidae
Iricinia campana
Unidentified orange encrusting sponge
Unidentified grey encrusting sponge
Unidentified black encrusting sponge
Unidentified blue sponge

Phylum: Cnideria
Class: Hydrozoa (Hydroids)
Order: Hydroida
Suborder: Leptomedusae (Thecate hydroid)
Suborder: Anthomedusae (Athecate hydroid)
Class: Anthozoa (Hard and Soft corals)
Order: Alcyonacea
Family: Telestinae
Carijoa riisei (White Telesto)
Family: Millorporinidae
Millorporina sp. (Fire Coral)
Order: Gorgonacae (Gorgonians)
Family: Plexauridae
Eunicea succinea
Plexorella sp.
Muriceopsis flavida
Family: Gorgoniidae
Pteogogia anceps (Sea Whip)
Pseudopteogogia acerosa
Pseudopterogogia bipinnata (Sea Whip)
Order: Scleractinia
Family: Faviidae
Manicina aerolata (Rose Coral)
Solenastrea bournoni (Smooth Starlet Coral)

Table 4: List of invertebrates identified on Experimental Reef 2.

Phylum: Annelida (Segmented worms)
- Class: Polychaeta
  - Family: Eunicidae
  - Family: Filogranidae
    - *Filograna huxleyi* (Sea frost)
  - Family: Nereidae
  - Family: Polynoidae (Scale Worms)
  - Family: Sabellidae
  - Family: Serpulidae
  - Family: Syllidae
  - Family: Terebellidae

Phylum: Sipuncula (Peanut Worms)

Phylum: Arthropoda
- Subphylum: Crustacea
  - Class: Maxillopoda
    - Subclass: Cirripedia (Barnacles)
      - Family: Balinidae
        - *Balanus amphitrite*
        - *Balanus trigonus*
  - Class: Malacostaca
    - Order: Decapoda
      - Family: Alpheidae
        - *Alpheus sp.* (Snapping shrimp)
        - *Synalpheus sp.*
      - Family: Diogenidae (Hermit crab)
      - Family: Grapsidae
        - *Percnon gibbesi* (Nimble Spray Crab)
      - Family: Majidae
        - *Mithrax sp.* (Clinging crab)
        - *Stenorhynchus seticornis* (Arrow crab)
      - Family: Palaemonidae
        - *Brachycarpus biunguicalatus* (Two Claw Shrimp)
      - Family: Palinuridae
        - *Panulirus argus* (Spiny lobster)
      - Family: Porcellanidae
        - *Megalobrachium soriatum* (Porcellain Crab)
        - *Petrolisthes galathinus* (Porcellain Crab)
      - Family: Xanthidae
        - *Pilumnus sp.*
      - Family: Stenopodidea
        - *Stenopus hispidus* (Coral Banded shrimp)
    - Order: Amphipoda
    - Order: Isopoda
    - Order: Mysidacea
    - Order: Tanaidacea

Table 4: Continued

Phylum: Mollusca
Class: Gastropoda
Family: Cerithiidae
Cerithium litteratum (Stocky cerith)
Family: Crepidulinae
Crepidula aculeata (Spiny slipper shell)
Family: Cyphomidae
Cyphoma gibbosum (Flamingo Tongue)
Family: Fissurellidae
Punctarella sp. (Limpet)
Family: Murcidae
Murex pomum (Apple Murex)
Family: Purpurinae
Thais rustica (Rustic Rock Shell)
Family: Triviinea
Trivia pediculus (Coffee Bean Trivia)
Subclass: Opistobranchia
Order: Nudibranchia
Class: Bivalvia
Family: Arcidae
Family: Chamidae
Chama macerophylla (Leafy Jewel Box)
Family: Cardiidae
Papyridae soleniformis (Spiny Paper Cockel)
Family: Mytilidae (Mussels)
Modiolus americanus
Family: Limidae
Lima lima (Spiny Lima)
Lima scabra (Flame Scallop)
Family: Pteriidae (Wing oysters)
Pinctada imbricata
Pteria colymbus (Atlantic Wing Oyster)
Family: Ostreidae (Oyster)
Ostrea permollis (Sponge oyster)
Family: Spondylidae
Spondylus sp. (Thorny Oyster)

Phylum: Ectoprocta (Brozoans)
Class: Gymnolaemata
Order: Cheilostomata
Family: Alderinidae
Antropora leucocypha
Family: Microporellidae
Microporella sp.
Family: Smittinidae
Parasmittina sp.
Family: Schizoporellidae
Stylopoma sp

Table4: Continued

Order: Cyclostomata

Family: Crisiidae
Cristia eburnea
Unidentified green encrusting bryozoan
Unidentified orange encrusting bryozoan

Phylum: Echinodermata
Class: Ophiuroidae
Order: Ophiurae (Brittle stars)
Class: Echinoidea
Family: Cidaridae
Eucidaris tribuloides (Pencil Urchin)
Family: Diadematidae
Diadema antillarum (Long-Spined Urchin)
Class: Holothuridea (Sea Cucumbers)

Phylum: Chordata
Class: Ascidiacea (Tunicates)
Order: Enterogona
Family: Ascidiidae
Ascidia nigra
Ascidia sp.
Family: Didemnidae
Order: Pleurogona
Family: Pyuridae
Pyrura vitta
Family: Styelidae
Symplegma viride
Unidentified orange colonial ascidian
Unidentified red colonial ascidian
Unidentified grey colonial ascidian
Unidentified solitary ascidian

Table 4: Continued

FISHES: CONTROL REEF 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: MORAY EELS	MURAENIDAE											
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	1	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	1
FAMILY: SEA BASSES	SERRANIDAE											
Black Grouper	*Mycteroperca bonaci*	0	0	0	0	0	1	0	3	1	1	2
Gag	*Mycteroperca microlepis*	0	0	0	0	0	0	0	0	1	0	0
Sand Perch	*Diplectrum formosum*	2	1	1	1	1	1	2	1	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE											
Flamefish	*Apogon maculatus*	0	0	0	0	0	1	2	1	2	0	0
Twospot Cardinalfish	*Apogon pseudomaculatus*	0	0	0	0	0	0	0	0	0	2	1
FAMILY: JACKS	CARANGIDAE											
Amberjack	*Seriola dumerili*	0	0	0	0	5	7	0	1	8	1	0
Blue Runner	*Caranx crysos*	0	0	0	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	0	1	0	0
FAMILY: SNAPPERS	LUTJANIDAE											
Yellowtail Snapper	*Ocyurus chrysurus*	0	0	0	0	0	1	0	1	1	0	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	2	7	4	5	2	12	2	2	3	2	2
Lane Snapper	*Lutjanus synagris*	1	0	1	1	1	2	1	13	13	11	2
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	2	0	1	0	0
FAMILY: MOJARRAS	GERREIDAE											
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE											
Cottonwick	*Haemulon melanurum*	0	0	0	0	0	0	0	0	0	2	0
White Grunt	*Haemulon plumieri*	2	1	1	1	1	1	1	3	3	2	1
Tomtates	*Haemulon aurolineatum*	0	10	50	0	30	300	150	200	50	200	0
Juvenile Grunts	*Haemulon juveniles*											
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	0	0	0	0	0	0	0	0	0	2	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	0	0	0	0	0	2	1	1	1	1	1
Pigfish	*Orthopristis chrysoptera*	0	0	0	0	0	0	0	0	0	0	0

Table 5: Year 1 Fishes counted on Control Reef **1** at each sample date.

FISHES: CONTROL REEF 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-6-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: PORGIES	SPARIDAE											
Pinfish	*Lagodon rhomboides*	0	1	0	0	0	0	0	0	0	0	0
Saucereye Porgy	*Calamus calamus*	0	0	0	1	0	0	0	0	0	0	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	1	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE											
Highhat	*Equetus acuminatus*	0	0	0	0	0	0	1	0	1	1	1
FAMILY: GOATFISHES	MULLIDAE											
Spotted Goatfish	*Pseudupeneus maculatus*	0	0	0	0	0	0	0	0	1	0	0
Yellow Goatfish	*Mulloidichthys martinicus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE											
Spadefish	*Chaetodipterus faber*	0	0	0	0	0	0	1	0	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE											
Angelfish Juvenile	*Holocanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	0	1	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	0	0	0	0	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DAMSELFISHES	POMACENTRIDAE											
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE											
Spanish Hogfish	*Bodianus rufus (juv.)*	0	0	0	0	0	0	0	0	0	1	0
Clown wrasse	*Halichores maculipinna*	0	0	0	0	0	0	0	1	0	2	2
Slippery Dick	*Halichores bivittatus*	0	0	0	0	0	0	0	0	0	2	0
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	2	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	0	0
Bluehead Wrasse	*Thalassoma bifasciatum*	0	0	0	0	0	0	4	1	0	2	0
FAMILY: PARROTFISHES	SCARIDAE											
Parrotfish	SCARIDAE	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: BARRACUDAS	SPHYAENIDAE											
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0

Table 5: Continued

FISHES: CONTROL REEF 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: CLINIDS	CLINIDAE											
Clinid	Clinidae A	0	0	0	0	0	2	0	0	3	0	2
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0
FAMILY: COMBTOOTH BLENNI	BLENNIDAE											
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	1
FAMILY: GOBIES	GOBIIDAE											
Neon Goby	*Gobiosoma oceanops*	0	0	1	0	0	1	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofraenum*	0	0	0	0	0	0	0	0	0	0	1
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	1	0	0	0	0	0	0
FAMILY: SURGEONFISHES	ACANTHURIDAE											
Ocean Surgeon	*Acanthurus bahianus*	5	0	6	3	24	9	4	4	1	15	6
Doctorfish	*Acanthurus chirurgus*	0	0	0	0	0	0	0	1	1	0	0
FAMILY: LEFTEYE FLOUNDER	BOTHIDAE											
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	1
FAMILY: LEATHERJACKETS	BALISTIDAE											
Filefish	*Alutorus sp.*	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	1	0	0	0	0
Grey Trigger	*Balistes capriscus*	0	0	0	0	0	1	2	1	0	1	1
FAMILY: PUFFERS	TETRAODONTIDAE											
Sharpnose Puffer	*Canthigaster rostrata*	0	0	0	0	0	1	0	1	0	2	1
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	0	115	0	0	0	0	200

Table 5: Continued

FISHES: CONTROL REEF 2		DATE SAMPLED										
COMMON NAME	FISHES	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: MORAY EELS	MURAENIDAE											
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE											
Black Grouper	*Mycteroperca bonaci*	0	0	0	0	0	1	0	1	1	0	1
Gag	*Mycteroperca microlepis*	0	0	0	0	0	0	0	0	0	0	0
Sand Perch	*Diplectrum formosum*	1	0	1	0	1	1	2	3	0	1	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE											
Flamefish	*Apogon maculatus*	0	0	0	0	0	1	0	0	0	0	0
Twospot Cardinalfish	*Apogon pseudomaculatus*	0	0	0	0	0	0	1	1	1	0	2
FAMILY: JACKS	CARANGIDAE											
Amberjack	*Seriola dumerili*	0	0	0	0	0	5	1	0	8	3	0
Blue Runner	*Caranx crysos*	0	0	5	0	0	0	0	1	0	0	2
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SNAPPERS	LUTJANIDAE											
Yellowtail Snapper	*Ocyurus chrysurus*	0	0	0	0	1	0	1	0	0	1	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	0	3	9	2	6	2	9	2	4	7	20
Lane Snapper	*Lutjanus synagris*	1	0	0	1	6	4	1	3	2	15	5
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	0	0	1	0	0
FAMILY: MOJARRAS	GERREIDAE											
Yellowfin Mojarra	*Gerres cinereus*	2	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE											
Cottonwick	*Haemulon melanurum*	0	0	1	0	0	0	0	1	1	0	0
White Grunt	*Haemulon plumieri*	2	0	9	0	7	16	3	3	4	4	3
Tomtates	*Haemulon aurolineatum juvenile*	0	50	150	300	50	50	100	100	50	60	5
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	0	1	1
French Grunt	*Haemulon flavolineatum*	0	0	0	0	0	0	0	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	1	0
Porkfish	*Anisotremus virginicus*	0	0	0	0	0	0	0	2	1	0	0
Pigfish	*Orthopristis chrysoptera*	0	0	3	3	1	1	1	0	0	1	1

Table 6: Year 2 fishes counted on Control Reef 2 at each sample date.

FISHES: CONTROL REEF 2		DATE SAMPLED										
COMMON NAME	FISHES	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: CLINIDS	CLINIDAE	0	0	0	0	0	1	0	0	2	0	0
Clinid	Clinidae A	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0
FAMILY: COMBTOOTH BLENNI	BLENNIDAE	0	0	0	0	0	0	0	0	0	0	0
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE	0	0	0	0	0	0	0	0	0	0	0
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Corphopterus glaucofraenum*	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	2	12	5	2	16	3	4	6	3	12	5
FAMILY: SURGEONFISHES	ACANTHURIDAE	0	0	0	0	0	0	0	0	3	0	0
Ocean Surgeon	*Acanthurus bahianus*	0	0	0	0	0	0	0	0	0	0	0
Doctorfish	*Acanthurus chirurgus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDER	BOTHIDAE	0	0	0	1	0	0	0	0	0	0	0
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	1	0	0	0	4	1	0
FAMILY: LEATHERJACKETS	BALISTIDAE	0	0	0	0	0	0	0	0	0	0	0
Filefish	*Aluteus sp.*	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes capriscus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: PUFFERS	TETRAODONTIDAE	0	0	0	0	0	0	0	0	0	0	0
Sharpnose Puffer	*Canthigaster rostrata*	0	0	0	0	0	0	0	0	0	0	0
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	0	0	0	0	0	0
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	0	0	0	0	0	0	0

Table 6: Continued

FISHES: CONTROL REEF 2		DATE SAMPLED										
COMMON NAME	FISHES	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: PORGIES	SPARIDAE											
Pinfish	*Logodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0
Saucereye Porgy	*Calamus calamus*	0	0	0	0	0	0	0	0	0	0	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE											
Highhat	*Equetus acuminatus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOATFISHES	MULLIDAE											
Spotted Goatfish	*Pseudupeneus maculatus*	0	0	2	0	0	0	1	2	0	1	0
Yellow Goatfish	*Mulloidichthys martinicus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE											
Spadefish	*Chaetodipterus faber*	2	0	0	0	0	0	0	0	1	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE											
Angelfish Juvenile	*Holocanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	0	1	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	0	0	0	1	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	1
FAMILY: DAMSELFISHES	POMACENTRIDAE											
Dusky Damselfish	*Stegates fuscus*	0	0	0	0	0	0	1	1	1	1	1
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE											
Spanish Hogfish	*Bodianus rufus juvenile*	0	0	0	0	0	0	0	0	0	0	0
Clown wrasse	*Halichores maculipinna*	0	0	0	1	0	0	0	2	2	0	1
Slippery Dick	*Halichores bivittatus*	0	0	0	0	0	0	0	1	1	4	3
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	1	1
Bluehead Wrasse	*Thalassoma bifasciatum*	0	0	0	0	0	0	3	0	0	0	0
FAMILY: PARROTFISHES	SCARIDAE											
Parrotfish	SCARIDAE	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: BARRACUDAS	SPHYAENIDAE											
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0

Table 6: Continued

FISHES: EXPERIMENTAL 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: MORAY EELS	MURAENIDAE											
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	1	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE											
Black Grouper	*Mycteroperca bonaci*	0	0	0	0	0	0	1	1	2	6	3
Gag	*Mycteroperca microlepis*	0	0	0	0	0	0	0	0	0	0	0
Sand Perch	*Diplectum formosum*	1	0	0	0	0	3	1	1	0	1	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE											
Flamefish	*Apogon maculatus*	0	0	0	0	1	0	2	0	1	0	0
Twospot Cardinalfish	*Apogon pseudomaculatus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: JACKS	CARANGIDAE											
Amberjack	*Seriola dumerili*	0	0	10	0	0	0	0	0	8	3	1
Blue Runner	*Caranx crysos*	0	0	17	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	0	0	1	0
FAMILY: SNAPPERS	LUTJANIDAE											
Yellowtail Snapper	*Ocyurus chrysurus*	0	0	2	1	4	0	0	0	0	0	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	1	8	7	8	5	5	4	12	0	13	25
Lane Snapper	*Lutjanus synagris*	0	1	1	0	0	4	1	1	0	0	1
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	2	0	1	0	0
FAMILY: MOJARRAS	GERREIDAE											
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	3	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE											
Cottonwick	*Haemulon melanurum*	1	0	0	0	0	0	0	0	0	0	1
White Grunt	*Haemulon plumieri*	0	0	3	1	11	1	1	4	0	4	2
Tomtates	*Haemulon aurolineatum (juv.)*	0	0	10	200	150	300	200	500	1000	300	0
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	1	0	0
French Grunt	*Haemulon flavolineatum*	0	0	0	0	0	0	0	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	0	0	1	1	1	2	3	3	2	2	1
Pigfish	*Orthopristis chrysoptera*	0	0	0	0	0	0	0	0	0	0	2

Table 7: Year 1 fishes counted on Experimental Reef 1 at each sample date.

FISHES: EXPERIMENTAL 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: PORGIES	SPARIDAE											
Pinfish	*Lagodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0
Saucereye Porgy	*Calamus calamus*	0	0	0	0	2	0	0	0	0	0	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE											
Highhat	*Equetus acuminatus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOATFISHES	MULLIDAE											
Spotted Goatfish	*Pseudupeneus maculatus*	0	0	1	0	0	2	0	0	3	1	0
Yellow Goatfish	*Mulloidichthys martinicus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE											
Spadefish	*Chaetodipterus faber*	1	2	3	3	4	5	4	5	3	2	1
FAMILY: ANGELFISHES	POMACANTHIDAE											
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	0	0	0
Gray Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	0	0	0	0	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DAMSELFISHES	POMACENTRIDAE											
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE											
Spanish Hogfish	*Bodianus rufus (juv.)*	0	0	0	0	0	2	2	2	1	2	1
Clown wrasse	*Halichores maculipinna*	0	0	1	0	0	4	0	2	3	2	4
Slippery Dick	*Halichores bivittatus*	0	0	0	0	0	0	0	2	1	5	7
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	1	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	0	0
Bluehead Wrasse	*Thalassoma bifasciatum*	0	0	0	0	0	1	3	0	0	2	0
FAMILY: PARROTFISHES	SCARIDAE											
Parrotfish	SCARIDAE	0	0	0	0	0	0	1	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	0	0	0	0	0	0	0	0	0	1	0
FAMILY: BARRACUDAS	SPHYAENIDAE											
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	1	0	0

Table 7: Continued

FISHES: EXPERIMENTAL 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: CLINIDS	CLINIDAE											
Clinid	Clinidae A	0	0	0	0	0	0	0	0	1	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	1	0
FAMILY: COMBTOOTH BLENNI	BLENNIDAE											
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE											
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofraenum*	0	0	0	0	0	0	0	0	1	1	0
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	1	0	0	0	0	0
FAMILY: SURGEONFISHES	ACANTHURIDAE											
Ocean Surgeon	*Acanthurus bahianus*	18	0	6	10	7	2	5	1	10	0	8
Doctorfish	*Acanthurus chirurgus*	0	0	0	0	0	0	0	0	0	1	2
FAMILY: LEFTEYE FLOUNDER	BOTHIDAE											
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE											
Filefish	*Aluterus sp.*	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	1	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes ocapriscus*	0	0	0	0	0	0	1	2	1	0	2
FAMILY: PUFFERS	TETRAODONTIDAE											
Sharpnose Puffer	*Canthigaster rostrata*	0	0	0	0	1	0	0	0	2	0	1
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	0	50	200	0	0	0	0

Table 7: Continued

FISHES: EXPERIMENTAL 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: MORAY EELS	MURAENIDAE											
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	1
FAMILY: SEA BASSES	SERRANIDAE											
Black Grouper	*Mycteroperca bonaci*	0	0	0	0	0	0	1	0	2	1	1
Gag	*Mycteroperca microlepis*	0	0	0	0	0	0	1	0	0	0	0
Sand Perch	*Diplectrum formosum*	0	0	0	0	0	0	0	0	1	0	1
Harlequin Bass	*Serranus tigrinus*	1	0	0	1	0	1	2	0	0	1	0
FAMILY: CARDINALFISHES	APOGONIDAE											
Flamefish	*Apogon maculatus*	0	0	0	0	0	2	2	0	1	0	0
Twospot Cardinalfish	*Apogon pseudomaculatus*	0	0	0	0	0	0	0	0	0	0	2
FAMILY: JACKS	CARANGIDAE											
Amberjack	*Seriola dumerili*	0	0	8	9	0	0	0	0	0	0	1
Blue Runner	*Caranx crysos*	0	0	0	0	4	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	1	0	0	0	0	0	0	0	0	0	0
FAMILY: SNAPPERS	LUTJANIDAE											
Yellowtail Snapper	*Ocyurus chrysurus*	0	0	1	1	4	3	0	0	0	0	0
Mahogany Snapper	*Lutjanus mahogani*	1	0	0	0	0	0	0	0	0	0	0
Gray Snapper	*Lutjanus griseus*	2	4	5	8	8	16	8	19	3	14	9
Lane Snapper	*Lutjanus synagris*	0	0	0	0	1	0	5	1	1	20	0
Mutton Snapper	*Lutjanus analis*	0	0	1	0	0	1	0	1	0	0	0
FAMILY: MOJARRAS	GERREIDAE											
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE											
Cottonwick	*Haemulon melanurum*	0	0	0	1	0	0	0	1	1	3	4
White Grunt	*Haemulon plumieri*	2	0	0	1	1	1	2	2	21	4	1
Tomtates	*Haemulon aurolineatum (juv.)*	100	100	500	200	300	200	300	200	100	200	200
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	1	1	0
French Grunt	*Haemulon flavolineatum*	0	0	0	0	0	0	0	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	0	0	0	0	0	0	0	0	0	0	0
Pigfish	*Orthopristis chrysoptera*	0	1	0	1	0	1	0	1	0	1	1
		0	0	0	0	0	0	0	0	0	30	13

Table 8: Year 1 fishes counted on Experimental Reef 2 at each sample date.

FISHES: EXPERIMENTAL 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: PORGIES	SPARIDAE											
Pinfish	*Lagodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0
Saucereye Porgy	*Calamus calamus*	0	2	0	1	2	0	4	0	0	0	3
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE											
Highhat	*Equetus acuminatus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOATFISHES	MULLIDAE											
Spotted Goatfish	*Pseudupeneus maculatus*	0	0	0	1	0	0	0	1	0	3	3
Yellow Goatfish	*Mulloidichthys martinicus*	0	0	0	0	0	0	0	0	0	0	1
FAMILY: SPADEFISHES	EPHIPPIDAE											
Spadefish	*Chaetodipterus faber*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE											
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	0	0	0
Gray Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	0	0	0	1	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DAMSELFISHES	POMACENTRIDAE											
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	1	0	0	0	0
FAMILY: WRASSES	LABRIDAE											
Spanish Hogfish	*Bodianus rufus (juv.)*	0	0	2	3	2	2	3	2	2	2	1
Clown wrasse	*Halichores maculipinna*	0	0	0	0	0	0	0	3	2	0	1
Slippery Dick	*Halichores bivittatus*	0	0	0	0	0	0	1	0	5	4	0
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	1	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	0	0
Bluehead Wrasse	*Thalassoma bifasciatum*	0	0	0	0	0	2	2	0	0	1	0
FAMILY: PARROTFISHES	SCARIDAE											
Parrotfish	SCARIDAE	0	0	0	0	0	0	0	0	0	0	2
Parrotfish	*Sparisoma sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: BARRACUDAS	SPHYAENIDAE											
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0

Table 8: Continued

FISHES: EXPERIMENTAL 1		DATE SAMPLED										
COMMON NAME	SCIENTIFIC NAME	4-7-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
FAMILY: CLINIDS	CLINIDAE											
Clinid	Clinidae A	0	0	0	0	0	1	0	0	2	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0
FAMILY: COMBTOOTH BLENNI	BLENNIDAE											
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE											
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	1	0	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofraenum*	0	0	0	0	0	0	0	0	0	0	6
Goby	Gobiidae A	0	0	1	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	1	0	0	0	0	0
FAMILY: SURGEONFISHES	ACANTHURIDAE											
Ocean Surgeon	*Acanthurus bahianus*	2	17	0	10	35	2	4	3	5	10	3
Doctorfish	*Acanthurus chirurgus*	0	0	0	0	0	0	2	0	1	0	2
FAMILY: LEFTEYE FLOUNDER	BOTHIDAE											
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE											
Filefish	*Aluterus sp.*	0	1	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	2	0	0	0	0	0
Grey Trigger	*Balistes ocapriscus*	0	1	1	0	0	1	2	1	0	0	0
FAMILY: PUFFERS	TETRAODONTIDAE											
Sharpnose Puffer	*Canthigaster rostrata*	0	0	0	0	0	0	0	0	1	0	2
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	100	0	0	0	0	0	0

Table 8: Continued

FISHES: CONTROL REEF 1		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-28-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: STINGRAY	DASYATIDAE												
Southern stingray	*Dasyatis americana*	0	1	0	0	0	0	0	0	1	0	0	0
FAMILY: MORAY EELS	MURAENIDAE												
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0	0
Purplemouth Moray	*Gymnothorax vicinus*	2	1	0	1	0	1	0	1	1	0	1	0
FAMILY: HERRINGS	CLUPEIDAE												
Clupeid	Clupeid	0	0	0	0	0	0	0	100	0	0	0	0
FAMILY: SQUIRRELFISHES	HOLOCENTRIDAE												
Blackbar soldierfish	*Myripristis jacobus*	0	0	0	0	0	0	0	1	0	0	0	0
Squirrelfish	*Holocentrus ascensionis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: TRUMPETFISHES	AULOSTOMIDAE												
Trumpetfish	*Aulostomus maculatus*	0	0	0	0	0	0	0	0	0	1	0	0
FAMILY: SEA BASSES	SERRANIDAE												
Black Grouper	*Mycteroperco bonaci*	2	1	1	1	1	1	0	1	1	1	1	0
Gag	*Mycteroperco microlepis*	0	0	0	0	0	1	0	0	0	0	0	0
Sand Perch	*Diplectum formosum*	1	1	0	0	0	0	1	0	0	0	0	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE												
Cardinalfish	*Apogon sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Flamefish	*Apogon maculatus*	0	0	3	3	1	0	1	1	3	0	1	2
Twospot Cardinalfish	*Apogon pseudomaculatus*	3	4	0	0	2	3	0	0	0	0	1	1
FAMILY: JACKS	CARANGIDAE												
Amberjack	*Seriola dumerili*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Runner	*Caranx crysos*	0	0	0	0	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	1	0	0	0	0	0	2	0	0	0
Yellow Jack	*Caranx bartholomaei*	1	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	*Ocyurus chrysurus*	0	1	0	0	0	0	0	0	0	1	1	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	25	15	0	0	0	0	1	2	8	1	18	16
Lane Snapper	*Lutjanus synagris*	3	5	0	0	0	0	0	0	0	0	0	0
Mutton Snapper	*Lutjanus analis*	0	1	0	0	0	0	0	0	0	0	0	0

Table 9: Year 2 Fishes counted on Control Reef 1

FISHES: CONTROL REEF 1		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-28-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: MOJARRAS	GERREIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Yellowfin Mojarra	*Gerres cinereus*	0	2	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE	0	1	2	3	11	2	1	1	1	1	1	2
Cottonwick	*Haemulon melanurum*	1	3	0	0	0	0	0	40	150	4	3	4
White Grunt	*Haemulon plumieri*	1	0	0	0	0	0	0	0	0	0	0	0
Tomtates	*Haemulon aurolineatum (juv.)*	0	0	0	1	0	0	0	1	1	0	1	1
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	0	0	0	0	0	0	0	0	0	0	0	0
Spanish Grunt	*Haemulon macrostomum*	0	0	0	0	0	0	0	0	0	0	0	0
Bluestripe Grunt	*Haemulon sciurus*	0	0	0	0	0	0	0	0	0	0	0	0
Sailors Choice	*Haemulon parrai*	0	0	0	0	0	0	0	0	3	1	4	1
Black Margate	*Anisotremus surinamensis*	2	1	4	1	3	1	0	1	2	0	0	1
Porkfish	*Anisotremus virginicus*	0	0	0	0	0	0	0	0	0	0	0	0
Pigfish	*Orthopristis chrysoptera*	0	0	0	0	0	0	0	0	0	0	2	0
FAMILY: PORGIES	SPARIDAE	0	0	0	0	0	0	0	2	2	0	1	0
Pinfish	*Lagodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0	0
Spottail Pinfish	*Diplodus holbrooki*	0	0	0	0	0	0	0	0	0	0	0	0
Saucereye Porgy	*Calamus calamus*	0	0	0	0	0	0	0	1	2	0	0	0
Grass Porgy	*Calamus arctifrons*	1	0	0	0	0	0	0	1	1	0	0	2
FAMILY: DRUMS	SCIAENIDAE	1	1	0	1	0	0	0	1	1	0	0	3
Highhat	*Equetus acuminatus*	1	1	0	0	0	0	0	0	0	0	0	0
FAMILY: GOATFISHES	MULLIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Goatfish	*Pseudupeneus maculatus*	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Goatfish	*Mulloidichthys martinicus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA CHUBS	KYPHOSIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Bermuda Chub	*Kyphosus sectatrix*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Spadefish	*Chaetodipterus faber*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Angelfish Juvenile	*Holocanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0
Queen Angelfish	*Holocanthus ciliaris*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Angelfish	*Holocanthus bermudensis*	0	0	0	0	0	0	0	0	0	1	0	1
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	1	0	1	1
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	0	0	0	0	0	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0

Table 9: Continued

FISHES: CONTROL REEF 1		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-28-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: DAMSELFISHES	POMACENTRIDAE												
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	0	0	0	0	0	0	0	0
Threespot Damselfish	*Stegastes planifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Cocoa Damselfish	*Stegastes variabilis*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	*Lachnolaimus maximus*	0	0	1	1	0	0	0	0	0	0	0	0
Spanish Hogfish	*Bodianus rufus (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0
Clown wrasse	*Halichores maculipinna*	7	10	2	6	1	2	1	4	1	0	0	0
Slippery Dick	*Halichores bivittatus*	0	1	5	3	10	5	5	2	4	7	2	4
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	0	0	0
Bluehead Wrasse	*Thalassoma bifasciatum*	3	3	0	1	0	0	0	1	2	0	2	2
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	SCARIDAE	0	0	0	0	0	1	0	0	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	0	2	2	1	0	0	0	0	0	2	1	0
Red tail Parrotfish	*Sparisoma chrospterum*	0	0	0	0	0	0	0	0	0	0	0	0
Stoplight Parrotfish	*Sparisoma viride*	0	0	0	0	0	0	0	1	1	0	1	0
Redlin Parrotfish	*Sparisoma rubripinne*	0	0	0	0	0	0	0	0	0	0	0	0
Redband Parrot	*Sparisoma aurofrenatum*	0	0	0	0	0	0	0	0	0	0	0	1
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	*Dactyloscopus sp. (?)*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CLINIDS	CLINIDAE												
Clinid	Clinidae A	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0	0

Table 9: Continued

FISHES: CONTROL REEF 1													
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: COMBTOOTH BLENNIES	BLENNIDAE												
Blenny	*Blennidae*	4	0	1	1	0	0	0	0	0	0	0	0
Redlip Blenny	*Ophioblennius atlanticus*	0	1	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofraenu*	1	2	0	2	0	0	0	1	0	0	2	1
Masked Goby	*Coryphopterus personatus*	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	*Acanthurus bahianus*	1	10	5	10	6	6	3	4	25	20	7	50
Doctorfish	*Acanthurus chirurgus*	1	1	3	3	2	1	1	0	2	1	1	1
Blue tang	*Acanthurus coeruleus*	0	1	0	0	0	0	0	0	0	0	0	0
FAMILY: MACKERAL	SCOMBRIDAE												
Cero	*Scomberomorus regalis*	0	0	0	1	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	SCORPAENIDAE												
Spotted Scorpionfish	*Scorpaena plumieri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDERS	BOTHIDAE												
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE												
Filefish	*Aluterus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes capriscus*	1	1	0	0	0	3	2	1	1	1	4	0
FAMILY: BOXFISHES	OSTRACIIDAE												
Scrawled cowfish	*Lactrophrys quadricornis*	0	0	0	1	1	0	0	0	0	0	0	0
Spotted trunkfish	*Lactrophrys trigonus*	0	0	1	0	0	0	0	0	0	0	0	0
Smooth trunkfish	*Lactrophrys triqueter*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	*Canthigaster rostrata*	1	0	0	0	0	0	0	1	3	3	3	0
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	*Diodon hystrix*	0	0	0	0	0	0	0	0	0	0	0	0
Balloonfish	*Diodon holocanthus*	0	0	0	0	0	0	0	0	0	0	0	1
Unidentified Juveniles	UNID. JUVENILES	100	0	500	0	0	0	0	0	0	0	0	1000

Table 9: Continued

FISHES: CONTROL REEF 2		DATE SAMPLED											
COMMON NAME	FISHES	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: STINGRAY	DASYATIDAE												
Southern stingray	*Dasyatis americana*	0	0	0	0	0	0	0	0	1	0	0	0
FAMILY: MORAY EELS	MURAENIDAE												
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0	0
Purplemouth Moray	*Gymnothorax vicinus*	0	0	0	0	1	1	0	0	0	0	0	1
FAMILY: HERRINGS	CLUPEIDAE												
Clupeid	Clupeid	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SQUIRRELFISHES	HOLOCENTRIDAE												
Blackbar soldierfish	*Myripristis jacobus*	1	1	1	1	1	1	2	2	1	1	1	0
Squirrelfish	*Holocentrus ascensionis*	0	1	0	1	0	0	0	0	0	1	1	0
FAMILY: TRUMPETFISHES	AULOSTOMIDAE												
Trumpetfish	*Aulostomus maculatus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE												
Black Grouper	*Mycteroperca bonaci*	0	0	0	0	0	1	0	0	1	0	1	0
Gag	*Mycteroperca microlepis*	0	0	1	0	0	0	1	0	0	1	1	0
Sand Perch	*Diplectum formosum*	0	0	0	0	0	0	0	0	0	0	0	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE												
Cardinalfish	*Apogon sp.*	0	0	0	0	0	0	0	0	0	0	0	1
Flamefish	*Apogon maculatus*	0	0	0	0	0	0	1	0	2	3	2	1
Twospot Cardinalfish	*Apogon pseudomaculatus*	4	1	0	0	0	2	1	0	0	0	0	0
FAMILY: JACKS	CARANGIDAE												
Amberjack	*Seriola dumerili*	0	0	9	20	0	3	0	1	0	0	1	0
Blue Runner	*Caranx crysos*	0	0	0	0	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	0	0	1	0	0
Yellow Jack	*Caranx bartholomaei*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	*Ocyurus chrysurus*	0	0	0	1	0	1	1	1	0	0	2	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	4	11	9	2	2	9	1	1	0	15	22	22
Lane Snapper	*Lutjanus synagris*	1	10	0	0	5	0	0	0	0	0	0	0
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	0	0	0	0	0	0

Table 10: Year 2 fishes counted on Control Reef 2.

FISHES: CONTROL REEF 2		DATE SAMPLED											
COMMON NAME	FISHES	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-5-94
FAMILY: MOJARRAS	GERREIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE	0	0	0	0	0	0	0	2	1	2	3	6
Cottonwick	*Haemulon melanurum*	0	1	1	4	2	1	0	20	150	20	100	100
White Grunt	*Haemulon plumieri*	3	50	2	4	25	20	16	0	1	0	0	0
Tomtates	*Haemulon aurolineatum juveni*	0	0	1	1	0	0	0	1	1	1	1	0
Margate	*Haemulon album*	0	0	0	0	1	1	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	0	0	0	0	0	0	1	2	0	3	2	2
Spanish Grunt	*Haemulon macrostomum*	0	3	5	1	2	1	0	0	0	0	0	0
Bluestripe Grunt	*Haemulon sciurus*	0	0	0	0	0	0	0	0	0	0	0	0
Sailors Choice	*Haemulon parrai*	1	1	0	1	0	0	0	0	0	0	4	2
Black Margate	*Anisotremus surinamensis*	1	2	5	7	3	2	4	4	2	4	4	2
Porkfish	*Anisotremus virginicus*	1	0	1	0	0	0	0	0	0	0	0	0
Pigfish	*Orthopristis chrysoptera*												
FAMILY: PORGIES	SPARIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Pinfish	*Logodon rhomboides*	0	0	1	1	0	1	0	2	0	0	3	1
Sportail Pinfish	*Diplodus holbrooki*	3	0	0	0	3	1	0	1	0	0	0	0
Saucereye Porgy	*Calamus calamus*	0	0	0	0	0	0	0	0	0	0	0	0
Grass Porgy	*Calamus arctifrons*												
FAMILY: DRUMS	SCIAENIDAE	0	1	0	0	0	0	0	0	0	0	1	0
Highhat	*Equetus acuminatus*												
FAMILY: GOATFISHES	MULLIDAE	0	3	1	0	0	0	0	0	0	0	0	0
Spotted Goatfish	*Pseudupeneus maculatus*	2	1	1	0	0	0	0	0	1	0	20	0
Yellow Goatfish	*Mulloidichthys martinicus*												
FAMILY: SEA CHUBS	KYPHOSIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Bermuda Chub	*Kyphosus sectatrix*												
FAMILY: SPADEFISHES	EPHIPPIDAE	0	0	1	3	8	0	6	0	6	0	1	2
Spadefish	*Chaetodipterus faber*												
FAMILY: ANGELFISHES	POMACANTHIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Angelfish Juvenile	*Holocanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0
Queen Angelfish	*Holocanthus ciliaris*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Angelfish	*Holocanthus bermudensis*	1	2	1	1	1	1	1	0	1	0	1	0
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	0	0	0	0	0	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*												

Table 10: Continued

FISHES: CONTROL REEF 2		DATE SAMPLED											
COMMON NAME	FISHES	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: DAMSELFISHES	POMACENTRIDAE												
Dusky Damselfish	*Stegates fuscus*	1	0	1	0	0	0	0	0	0	0	0	0
Threespot Damselfish	*Stegastes planifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Cocoa Damselfish	*Stegastes variabilis*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	*Lachnolaimus maximus*	0	0	0	1	0	0	0	0	0	0	0	0
Spanish Hogfish	*Bodianus rufus juvenile*	0	0	1	0	1	2	0	1	0	0	0	0
Clown wrasse	*Halichores maculipinna*	10	1	5	2	1	4	0	2	4	0	1	0
Slippery Dick	*Halichores bivittatus*	0	5	5	4	3	2	5	4	0	1	3	0
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	0	0	0
Bluehead Wrasse	*Thalassoma bifasciatum*	0	0	0	0	0	2	0	0	0	0	0	0
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	SCARIDAE	1	1	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	0	0	0	2	0	0	0	0	0	0	1	0
Red tail Parrotfish	*Sparisoma chrysopterum*	0	1	0	0	0	0	0	0	0	0	0	0
Stoplight Parrotfish	*Sparisoma viride*	0	0	0	0	0	0	0	1	0	0	0	0
Redfin Parrotfish	*Sparisoma rubripinne*	0	0	0	0	0	0	0	0	0	0	0	0
Redband Parrot	*Sparisoma aurofrenatum*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	*Dactyloscopus sp. (?)*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CLINIDS	CLINIDAE												
Clinid	Clinidae A	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0	0

Table 10: Continued

FISHES: CONTROL REEF 2		DATE SAMPLED											
COMMON NAME	FISHES	9-10-93	10-16-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: COMBTOOTH BLEN	BLENNIDAE												
Blenny	Blennidae	2	0	0	0	1	1	1	1	1	2	0	0
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Corphopterus glaucofraenum*	1	0	0	1	2	2	0	0	3	6	1	4
Masked Goby	*Coryphopterus personatus*	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	*Acanthurus bahianus*	1	1	1	3	0	2	5	3	3	12	7	0
Doctorfish	*Acanthurus chirurgus*	1	0	2	1	0	0	1	1	0	0	0	0
Blue tang	*Acanthurus coeruleus*	1	1	2	1	1	1	1	1	1	1	1	0
FAMILY: MACKERAL	SCOMBRIDAE												
Cero	*Scomberomorus regalis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	SCORPAENIDAE												
Spotted Scorpionfish	*Scorpaena plumieri*	0	1	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDE	BOTHIDAE												
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE												
Filefish	*Aluteus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes capriscus*	2	0	1	1	1	1	2	1	1	1	1	5
FAMILY: BOXFISHES	OSTRACIIDAE												
Scrawled cowfish	*Lactophrys quadricornis*	0	0	1	0	1	1	0	0	0	0	0	0
Spotted trunkfish	*Lactophrys trigonus*	0	0	0	0	0	0	0	0	0	0	0	0
Smooth trunkfish	*Lactophrys triqueter*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	*Canthigaster rostrata*	1	0	0	0	0	1	0	0	1	1	0	1
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	1	0	0	0	0	0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	*Diodon hystrix*	1	0	0	0	0	0	0	0	0	0	0	0
Balloonfish	*Diodon holocanthus*	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Juveniles	UNID. JUVENILES	50	0	200	200	0	500	300	0	900	0	0	1000

Table 10: Continued

FISHES: EXPERIMENTAL 1		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: STINGRAY	DASYATIDAE												
Southern stingray	*Dasyatis americana*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MORAY EELS	MURAENIDAE												
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0	0
Purplemouth Moray	*Gymnothorax vicinus*	0	0	1	1	0	0	0	1	1	0	0	0
FAMILY: HERRINGS	CLUPEIDAE												
Clupeid	Clupeid	0	0	0	0	0	0	0	0	100	0	0	0
FAMILY: SQUIRRELFISHES	HOLOCENTRIDAE												
Blackbar soldierfish	*Myripristis jacobus*	0	0	0	0	0	0	0	0	0	0	0	0
Squirrelfish	*Holocentrus rufus*	0	0	0	0	0	0	0	0	1	0	1	0
FAMILY: TRUMPETFISHES	AULOSTOMIDAE												
Trumpetfish	*Aulostomos maculatus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE												
Black Grouper	*Mycteroperco bonaci*	1	1	1	1	2	1	1	2	1	2	1	1
Gag	*Mycteroperco microlepis*	0	1	1	1	0	0	1	1	1	0	0	0
Sand Perch	*Diplectum formosum*	0	0	0	0	0	0	0	0	0	0	0	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE												
Cardinalfish	*Apogon sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Flamefish	*Apogon maculatus*	0	0	0	2	0	0	0	0	1	0	0	0
Twospot Cardinalfish	*Apogon pseudomaculatus*	0	0	0	0	0	0	0	0	0	2	0	0
FAMILY: JACKS	CARANGIDAE												
Amberjack	*Seriola dumerili*	0	4	0	20	0	0	0	0	0	0	2	4
Blue Runner	*Caranx crysos*	2	0	0	0	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	0	0	4	0	1
Yellow Jack	*Caranx bartholomaei*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	*Ocyurus chrysurus*	0	0	0	0	2	0	0	0	0	0	0	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	1
Grey Snapper	*Lutjanus griseus*	3	10	10	0	0	0	2	1	0	3	20	30
Lane Snapper	*Lutjanus synagris*	0	5	1	0	1	0	0	0	0	0	0	0
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	0	0	0	0	0	0

Table 11: Year 2 fishes counted on Experimental Reef 1.

FISHES: EXPERIMENTAL 1		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-5-94
FAMILY: MOJARRAS	GERREIDAE												
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	1	0
FAMILY: GRUNTS	HAEMULIDAE												
Cottonwick	*Haemulon melanurum*	0	0	0	0	0	0	0	0	0	0	0	0
White Grunt	*Haemulon plumieri*	0	3	1	0	4	2	1	2	2	7	4	20
Tomtates	*Haemulon aurolineatum (juv.)*	1	4	0	13	8	20	20	25	150	30	0	200
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	0	3	0	3	8	5	5	4	11	6	7	6
Spanish Grunt	*Haemulon macrostomum*	2	0	0	0	0	0	0	0	0	0	0	0
Bluestripe Grunt	*Haemulon sciurus*	0	1	2	0	1	0	0	2	0	0	1	7
Sailors Choice	*Haemulon parrai*	0	1	0	0	0	0	0	0	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	2	2	3	7	2	2	2	1	3	3	0	6
Pigfish	*Orthopristis chrysoptera*	2	0	1	0	0	0	0	0	0	0	0	0
FAMILY: PORGIES	SPARIDAE												
Pinfish	*Lagodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0	0
Spottail Pinfish	*Diplodus holbrooki*	0	0	0	1	0	0	0	3	0	1	2	1
Saucereye Porgy	*Calamus calamus*	0	0	1	0	0	0	0	0	0	0	0	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE												
Highhat	*Equetus acuminatus*	1	1	0	0	0	0	0	0	0	0	0	0
FAMILY: GOATFISHES	MULLIDAE												
Spotted Goatfish	*Pseudupeneus maculatus*	0	2	1	0	0	0	0	0	1	0	1	1
Yellow Goatfish	*Mulloidichthys martinicus*	2	1	0	0	0	0	0	0	0	2	30	0
FAMILY: SEA CHUBS	KYPHOSIDAE												
Bermuda Chub	*Kyphosus sectatrix*	0	0	1	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE												
Spadefish	*Chaetodipterus faber*	4	0	2	2	6	8	2	8	6	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE												
Queen Angelfish	*Holocanthus ciliaris*	2	1	1	2	1	1	1	1	1	1	1	0
Blue Angelfish	*Holocanthus bermudensis*	0	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	1	0	0	0	0	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0

Table 11: Continued

FISHES: EXPERIMENTAL 1		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	0	0	0	0	0	0	0	0
Threespot Damselfish	*Stegastes planifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Cocoa Damselfish	*Stegastes variabilis*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	*Lachnolaimus maximus*	0	0	1	1	0	0	0	0	0	1	0	0
Spanish Hogfish	*Bodianus rufus (juv.)*	1	1	2	1	1	0	1	0	0	0	0	0
Clown wrasse	*Halichores maculipinna*	1	3	0	5	1	1	1	0	2	5	4	1
Slippery Dick	*Halichores bivittatus*	4	3	4	1	0	2	3	3	3	2	5	5
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	0	2	2
Bluehead Wrasse	*Thalassoma bifasciatum*	0	0	0	1	1	0	0	0	1	1	0	0
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	SCARIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	0	0	0	0	0	0	0	0	0	1	1	1
Red tail Parrotfish	*Sparisoma chrospterum*	0	1	0	0	1	0	0	0	0	0	0	0
Redfin Parrotfish	*Sparisoma rubripinne*	0	0	0	0	0	0	0	0	0	0	1	0
Stoplight Parrotfish	*Sparisoma viride*	0	0	0	0	0	0	0	2	1	0	2	3
Redband Parrot	*Sparisoma aurofrenatum*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	*Dactyloscopus sp. (?)*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CLINIDS	CLINIDAE												
Clinid	Clinidae A	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0	0

Table 11: Continued

FISHES: EXPERIMENTAL 1		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: COMBTOOTH BLE	BLENNIDAE												
Blenny	Blennidae	0	0	0	0	0	0	1	1	1	0	0	1
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofraenu*	5	0	0	2	0	3	1	2	0	0	2	1
Masked Goby	*Coryphopterus personatus*	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	*Acanthurus bahianus*	6	8	3	5	3	6	6	3	7	6	12	0
Doctorfish	*Acanthurus chirurgus*	0	1	0	2	1	1	1	2	3	1	0	0
Blue tang	*Acanthurus coeruleus*	0	0	0	1	0	0	0	0	0	0	0	1
FAMILY: MACKERAL	SCOMBRIDAE												
Cero	*Scomberomorus regalis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	SCORPAENIDAE												
Spotted Scorpionfish	*Scorpaena plumieri*	0	0	0	0	0	0	0	0	1	0	0	0
FAMILY: LEFTEYE FLOUND	BOTHIDAE												
Gull Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKET	BALISTIDAE												
Filefish	*Aluterus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes ccapriscus*	2	0	1	1	1	4	2	1	1	1	0	2
FAMILY: BOXFISHES	OSTRACIIDAE												
Scrawled cowfish	*Lactrophrys quadricornis*	0	0	0	0	1	0	0	0	0	0	0	0
Spotted trunkfish	*Lactrophrys trigonus*	0	0	0	0	0	0	0	0	0	0	0	0
Smooth trunkfish	*Lactrophrys triqueter*	0	0	0	0	0	0	1	0	0	0	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	*Canthigaster rostrata*	2	1	0	0	0	0	0	1	2	0	1	0
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	0	0	0		0	0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	*Diodon hystrix*	0	0	0	0	0	0	0	0	1	0	0	0
Balloonfish	*Diodon holocanthus*	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Juveniles	UNID. JUVENILES	50	0	0	0	0	0	0	0	0	0	0	1000

Table 11: Continued

FISHES: EXPERIMENTAL 2		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: STINGRAY	DASYATIDAE												
Southern stingray	*Dasyatis americana*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MORAY EELS	MURAENIDAE												
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0	0
Purplemouth Moray	*Gymnothorax vicinus*	0	1	0	0	1	0	1	0	1	1	0	0
FAMILY: HERRINGS	CLUPEIDAE												
Clupeid	Clupeid	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SQUIRRELFISHES	HOLOCENTRIDAE												
Blackbar soldierfish	*Myripristis jacobus*	0	0	0	0	0	0	0	0	0	0	0	0
Squirrelfish	*Holocentrus rufus*	0	0	0	0	0	0	0	0	0	1	0	0
FAMILY: TRUMPETFISHES	AULOSTOMIDAE												
Trumpetfish	*Aulostomus maculatus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE												
Black Grouper	*Mycteroperco bonaci*	0	2	0	1	1	2	1	0	0	1	1	1
Gag	*Mycteroperco microlepis*	1	1	0	0	1	1	1	0	0	0	1	0
Sand Perch	*Diplectum formosum*	0	0	0	0	0	0	0	0	0	0	0	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0	1
FAMILY: CARDINALFISHES	APOGONIDAE												
Cardinalfish	*Apogon sp.*	0	0	0	0	0	0	0	0	0	0	0	2
Flamefish	*Apogon maculatus*	0	0	1	1	0	0	0	0	4	3	3	0
Twospot Cardinalfish	*Apogon pseudomaculatus*	0	3	0	1	1	3	0	4	3	0	1	1
FAMILY: JACKS	CARANGIDAE												
Amberjack	*Seriola dumerili*	0	4	0	0	0	3	0	0	0	0	0	0
Blue Runner	*Caranx crysos*	1	0	0	0	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	0	0	2	0	1
Yellow Jack	*Caranx bartholomaei*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	*Ocyurus chrysurus*	0	5	0	0	0	3	0	2	0	1	1	5
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	35	6	12	0	0	2	10	0	16	5	18	2
Lane Snapper	*Lutjanus synagris*	1	7	3	0	0	0	0	0	0	0	0	0
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	0	0	0	0	0	0

Table 12: Year 2 Fishes counted on Experimental Reef 2.

FISHES: EXPERIMENTAL 2		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: MOJARRAS	GERREIDAE												
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE												
Cottonwick	*Haemulon melanurum*	1	1	0	0	0	0	1	1	1	1	1	1
White Grunt	*Haemulon plumieri*	2	0	3	1	1	0	1	2	3	2	1	3
Tomtates	*Haemulon aurolineatum (ju*	50	30	0	4	9	15	30	50	158	100	33	100
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	0	2	10	9	10	25	20	20	11	20	17	20
Spanish Grunt	*Haemulon macrostomum*	2	0	0	0	0	0	0	0	0	1	0	0
Bluestripe Grunt	*Haemulon sciurus*	0	0	3	3	1	2	0	0	0	1	5	1
Sailors Choice	*Haemulon parrai*	0	0	1	0	0	0	0	0	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	2	1	3	1	3	3	0	1	2	0	0	1
Pigfish	*Orthopristis chrysoptera*	10	3	1	0	0	0	0	0	0	0	0	0
FAMILY: PORGIES	SPARIDAE												
Pinfish	*Lagodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0	0
Spottail Pinfish	*Diplodos holbrooki*			1	0	0	0	0	0	0	0	2	0
Saucereye Porgy	*Calamus calamus*	0	0	0	0	0	2	4	0	0	0	1	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE												
Highhat	*Equetus acuminatus*	0	0	0	0	0	0	0	0	0	0	1	0
FAMILY: GOATFISHES	MULLIDAE												
Spotted Goatfish	*Pseudupeneus maculatus*	0	0	0	1	0	1	0	0	1	4	0	1
Yellow Goatfish	*Mulloidichthys martinicus*	1	5	0	0	0	0	1	1	1	0	17	0
FAMILY: SEA CHUBS	KYPHOSIDAE												
Bermuda Chub	*Kyphosus sectatrix*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE												
Spadefish	*Chaetodipterus faber*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE												
Queen Angelfish	*Holocanthus ciliaris*	0	0	0	0	0	0	0	0	0	0	0	1
Blue Angelfish	*Holocanthus bermudensis*	0	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	*Pomacanthus paru*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	0	0	0	0	0	0	0	0	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0

Table 12: Continued

FISHES: EXPERIMENTAL 2		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: DAMSELFISHES	POMACENTRIDAE												
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	0	0	0	0	0	0	0	0
Threespot Damselfish	*Stegastes planifrons*	0	1	1	1	1	1	1	1	1	1	1	1
Cocoa Damselfish	*Stegastes variabilis*	0	0	0	0	0	0	0	0	0	0	1	1
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	*Lachnolaimus maximus*	0	0	0	1	0	0	0	0	0	0	0	0
Spanish Hogfish	*Bodianus rufus (juv.)*	3	2	1	2	1	1	0	0	0	0	0	0
Clown wrasse	*Halichores maculipinna*	2	4	1	2	5	4	0	5	7	8	8	9
Slippery Dick	*Halichores bivittatus*	3	0	4	5	2	0	4	2	4	6	9	6
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	0	0	1	1
Bluehead Wrasse	*Thalassoma bifasciatum*	0	2	0	0	1	2	0	4	4	1	0	0
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	SCARIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0
Red tail Parrotfish	*Sparisoma chrospterum*	0	0	0	0	0	0	0	0	0	0	0	0
Redfin Parrot	*Sparisoma rubripinne*	0	0	0	0	0	0	0	0	0	0	1	0
Stoplight Parrotfish	*Sparisoma viride*	0	0	0	0	0	0	0	0	0	0	0	0
Redband Parrot	*Sparisoma aurofrenatum*	0	0	0	0	0	0	0	0	0	0	0	2
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	*Dactyloscopus sp.(?)*	0	0	0	0	0	1	0	0	1	0	0	1
FAMILY: CLINIDS	CLINIDAE												
Clinid	Clinidae A	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0	0

Table 12: Continued

FISHES: EXPERIMENTAL 2		DATE SAMPLED											
COMMON NAME	SCIENTIFIC NAME	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
FAMILY: COMBTOOTH BLENNI	BLENNIDAE												
Blenny	Blennidae	0	2	2	0	0	2	0	3	1	0	0	0
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofrae*	2	3	0	0	0	3	0	1	1	0	3	4
Masked Goby	*Coryphopterus personatus*	0	0	0	0	0	0	0	0	0	0	0	3
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	*Acanthurus bahianus*	6	16	6	5	5	4	4	4	15	0	7	5
Doctorfish	*Acanthurus chirurgus*	2	0	0	0	0	3	1	2	1	0	1	0
Blue tang	*Acanthurus coeruleus*	0	1	0	0	0	0	0	0	0	0	0	0
FMILY: MACKERAL	SCOMBRIDAE												
Cero	*Scomberomorus regalis*	0	0	0	1	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	SCORPAENIDAE												
Spotted Scorpionfish	*Scorpaena plumieri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDER	BOTHIDAE												
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE												
Filefish	Aluterus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	2	0	1	1	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	1	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes capriscus*	1	2	0	1	0	2	0	1	1	2	4	1
FAMILY: BOXFISHES	OSTRACIIDAE												
Scrawled cowfish	*Lactophrys quadricornis*	0	0	0	0	0	1	0	0	0	0	0	0
Spotted trunkfish	*Lactophrys trigonus*	0	0	0	0	0	0	0	0	0	0	0	0
Smooth trunkfish	*Lactophrys triqueter*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	*Canthigaster rostrata*	1	0	1	0	1	1	0	1	2	3	0	0
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	0	0	0	0		0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	*Diodon hystrix*	0	0	0	0	0	0	0	0	0	0	0	0
Balloonfish	*Diodon holocanthus*	0	0	0	0	0	0	0	0	0	1	1	0
Unidentified Juveniles	UNID. JUVENILES	0	50	0	0	0	0	300	300	300	0	0	1000

Table 12: Continued

FISHES: CONTROL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: STINGRAY	DASYATIDAE												
Southern stingray	*Dasyatis americana*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MORAY EELS	MURAENIDAE												
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0	0
Purplemouth Moray	*Gymnothorax vicinus*	0	0	0	0	1	1	0	1	0	0	1	0
FAMILY: HERRINGS	CLUPEIDAE												
Clupeid	Clupeid	0	1	0	0	0	0	0	0	0	0	0	0
FAMILY: LIZARDFISHES	SYNODONTIDAE												
Sand Diver	*Synodus intermedius*	0	0	0	0	0	0	1	0	0	0	0	0
FAMILY: SQUIRRELFISHES	HOLOCENTRIDAE												
Squirrelfish	*Holocentrus sp.*	0	0	0	0	0	0	1	0	0	0	0	0
Squirrelfish	*Holocentrus adscensionis*	0	0	0	0	0	0	0	2	6	5	3	2
Squirrelfish	*Holocentrus rufus*	0	0	0	0	0	0	0	0	0	0	0	0
Blackbar soldierfish	*Myripristis jacobus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: TRUMPETFISHES	AULOSTOMIDAE												
Trumpetfish	*Aulostomus maculatus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE												
Black Grouper	*Mycteroperca bonaci*	0	2	0	0	0	0	0	0	0	0	0	0
Gag	*Mycteroperca microlepis*	0	0	0	0	0	0	0	0	0	0	0	0
Red Grouper	*Epinephelus morio*	0	0	0	0	0	0	1	1	1	0	0	0
Sand Perch	*Diplectum formosum*	0	0	0	0	0	0	2	1	0	0	0	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE												
Cardinalfish	*Apogon sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Flamefish	*Apogon maculatus*	3	4	4	3	3	2	2	3	2	3	0	3
Twospot Cardinalfish	*Apogon pseudomaculatus*	1	1	0	0	0	0	2	0	0	3	2	0
FAMILY: JACKS	CARANGIDAE												
Amberjack	*Seriola dumerili*	0	0	3	0	0	0	0	0	1	2	3	0
Blue Runner	*Caranx crysos*	0	1	0	0	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	0	0	1	0	0	0	0	0	4	6
Yellow Jack	*Caranx bartholomaei*	0	0	0	0	0	0	0	0	0	0	0	0

Table 13: Year 3 fishes counted on Control reef 1 on each sample date.

FISHES: CONTROL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	Ocyurus chrysurus	0	0	0	0	0	0	0	0	0	0	0	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	Lutjanus griseus	8	2	30	8	4	3	9	8	9	10	16	16
Lane Snapper	Lutjanus synagris	3	0	0	0	0	0	0	0	1	1	0	0
Mutton Snapper	Lutjanus analis	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MOJARRAS	GERREIDAE												
Yellowfin Mojarra	Gerres cinereus	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE												
Cottonwick	Haemulon melanurum	0	0	0	0	0	0	0	1	2	3	1	2
White Grunt	Haemulon plumieri	0	1	2	1	0	1	0	0	2	1	1	1
Tomtates	Haemulon aurolineatum	50	30	6	20	50	50	30	25	50	200	50	30
Juvenile Grunts	Haemulon juveniles	30	0	25	0	0	0	0	20	0	100	0	200
Margate	Haemulon album	0	0	0	0	0	0	0	0	1	0	0	0
French Grunt	Haemulon flavolineatum	1	1	1	0	0	0	0	0	0	0	3	1
Spanish Grunt	Haemulon macrostomum	0	0	0	0	0	0	2	0	0	0	0	0
Bluestripe Grunt	Haemulon sciurus	0	0	0	0	1	0	0	0	0	0	0	0
Sailors Choice	Haemulon parrai	0	0	0	0	0	0	0	0	0	0	0	0
Black Margate	Anisotremus surinamensis	0	0	0	0	0	0	0	0	0	0	0	0
Porkfish	Anisotremus virginicus	1	1	7	4	3	3	2	2	3	2	1	2
Pigfish	Orthopristis chrysoptera	1	1	1	2	0	0	0	0	0	3	1	0
FAMILY: PORGIES	SPARIDAE												
Pinfish	Lagodon rhomboides	0	0	0	0	0	0	0	0	0	0	0	0
Spottail Pinfish	Diplodus holbrooki	0	1	3	1	3	1	0	1	0	2	0	0
Saucereye Porgy	Calamus calamus	1	1	1	0	0	1	1	0	0	0	1	0
Grass Porgy	Calamus arctifrons	0	0	0	0	0	0	0	0	0	0	0	0
Sheepshead Porgy	Calamus penna	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE												
Highhat	Equetus acuminatus	0	1	0	0	0	1	1	1	1	2	1	1
Cubbyu	Equetus umbrosus	0	0	0	0	0	0	0	0	0	0	1	0

TABLE 13: Continued

FISHES: CONTROL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7/25/95	8-7-95
FAMILY: GOATFISHES	MULLIDAE												
Spotted Goatfish	Pseudupeneus maculatus	2	1	1	0	0	0	0	0	0	0	0	0
Yellow Goatfish	Mulloidichthys martinicus	0	0	0	0	0	0	0	0	0	0	0	2
FAMILY: SEA CHUBS	KYPHOSIDAE												
Bermuda Chub	Kyphosus sectatrix	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE												
Spadefish	Chaetodipterus faber	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: BUTTERFLYFISHES	CHAETODONTIDAE												
Reef Butterflyfish	Chaetodon sedentarius	0	0	0	0	0	0	0	0	0	1	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE												
Queen Angelfish	Holocanthus ciliaris	0	0	0	0	0	0	0	0	0	0	0	0
Blue Angelfish	Holocanthus bermudensis	0	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	Pomacanthus paru	1	0	0	0	0	0	0	0	1	0	0	0
Grey Angelfish	Pomacanthus arcuatus	0	0	0	0	0	1	0	1	0	1	1	0
Angelfish Juvenile	Pomacanthus sp.	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DAMSELFISHES	POMACENTRIDAE												
Sergeant Major	Abudefduf saxatilis	0	0	0	0	0	0	0	0	1	0	0	0
Dusky Damselfish	Stegastes fuscus	0	0	0	0	0	0	0	0	0	0	0	0
Threespot Damselfish	Stegastes planifrons	0	0	0	0	0	0	0	0	0	0	0	0
Beaugregory	Stegastes leucostictus	0	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	Chromis cyanis	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	Lachnolaimus maximus	0	0	0	0	0	0	0	0	0	0	0	0
Spanish Hogfish	Bodianus rufus	0	0	0	0	0	0	0	0	0	0	0	0
Clown wrasse	Halichores maculipinna	4	4	5	0	1	0	1	2	2	3	4	4
Slippery Dick	Halichores bivittatus	0	1	1	3	5	4	7	0	1	1	3	2
Yellowcheek wrasse	Halichores cyanocephalus	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	Halichores radiatus	1	0	0	0	0	0	0	0	0	0	0	0
Bluehead Wrasse	Thalassoma bifasciatum	0	0	2	0	0	0	0	2	4	3	3	3

TABLE 13: Continued

FISHES: CONTROL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	Scaridae	0	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	Sparisoma sp. (juv.)	1	1	1	0	0	0	0	0	0	0	0	0
Red tail Parrotfish	Sparisoma chrysopterum	0	0	0	0	0	0	0	0	0	0	0	0
Redfin Parrot	Sparisoma rubripinne	1	0	0	0	0	0	0	0	0	0	0	0
Stoplight Parrotfish	Sparisoma viride	2	1	1	1	1	0	0	0	0	0	1	2
Redband Parrot	Sparisoma aurofrenatum	0	1	0	0	0	0	0	0	0	2	2	3
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	Sphyraena barracuda	1	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	Dactyloscopus sp.	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CLINIDS	CLINIDAE												
Clinid	Labrisomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: COMBTOOTH BLENNIES	BLENNIDAE												
Blenny	Blennidae	0	0	0	0	0	0	0	0	0	0	0	0
Molly Miller	Scartella cristata	0	0	0	0	0	0	0	0	0	0	0	0
Redlip Blenny	Ophioblennius atlanticus	0	0	0	0	0	0	0	0	0	0	0	0
Hairy Blenny	Labrisomus nuchipinnis	0	0	0	0	0	1	0	0	0	0	0	0
Seaweed Blenny	Parablennius marmoreus	0	0	0	0	0	0	0	0	0	0	0	0
Barred Blenny	Hypsorochilus bermudensis	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	Gobiosoma oceanops	0	0	0	0	0	0	0	0	1	1	1	1
Bridled Goby	Coryphopterus glaucofraenum	3	4	2	0	1	0	0	1	1	0	3	2
Masked Goby	Coryphopterus personatus	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae	0	0	0	0	0	1	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 13: Continued

FISHES CONTROL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	Acanthurus bahianus	5	5	2	6	6	1	1	3	8	8	15	15
Doctorfish	Acanthurus chirurgus	0	1	1	2	0	0	2	2	0	3	1	2
Blue tang	Acanthurus coeruleus	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MACKERAL	SCOMBRIDAE												
Cero	Scomberomorus regalis	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	SCORPAENIDAE												
Spotted Scorpionfish	Scorpaena plumieri	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDERS	BOTHIDAE												
Gulf Flounder	Paralichthys albigutta	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE												
Filefish	Aluterus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Scrawled Filefish	Aluterus scriptus	0	1	0	0	0	0	0	0	0	0	0	0
Orangefilefish	Aluterus schoepfi	0	0	0	0	0	0	0	1	0	0	0	0
Orangespotted Filefish	Cantherhines pullus	0	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	Cantherhines macrocerus	0	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	Balistes capriscus	2	3	0	0	0	1	1	0	0	1	1	0
FAMILY: BOXFISHES	OSTRACIIDAE												
Scrawled cowfish	Lactrophrys quadricornis	0	0	0	0	0	0	0	1	1	0	0	0
Spotted trunkfish	Lactrophrys bicornus	0	0	0	0	0	0	0	0	0	0	0	0
Smooth trunkfish	Lactrophrys triqueter	0	0	0	0	0	0	0	0	0	1	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	Canthigaster rostrata	1	1	0	0	0	0	0	0	0	0	0	1
Bandtail Puffer	Sphoeroides spengleri	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	Diodon hystrix	0	0	0	0	0	0	0	0	0	0	0	0
Balloonfish	Diodon holocanthus	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	0	0	5	0	0	0	0	0

Table 13: Continued

FISHES: CONTROL REEF 2													
COMMON NAME	FISHES	9-22-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: STINGRAY	DASYATIDAE												
Southern stingray	*Dasyatis americana*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MORAY EELS	MURAENIDAE												
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0	0
Purplemouth Moray	*Gymnothorax vicinus*	0	1	0	0	0	0	0	0	0	0	1	1
FAMILY: HERRINGS	CLUPEIDAE												
Clupeid	*Clupeid*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LIZARDFISHES	SYNODONTIDAE												
Sand Diver	*Synodus intermedius*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SQUIRRELFISHES	HOLOCENTRIDAE												
Squirrelfish	Holocentrus sp.	0	0	0	0	0	0	1	0	0	0	0	0
Squirrelfish	*Holocentrus adscensionis*	0	0	0	0	0	0	0	3	3	1	1	0
Blackbar soldierfish	*Myripristis jacobus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: TRUMPETFISHES	AULOSTOMIDAE												
Trumpetfish	*Aulostomus maculatus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE												
Black Grouper	*Mycteroperca bonaci*	0	1	0	0	0	0	0	0	0	1	0	0
Gag	*Mycteroperca microlepis*	0	0	0	0	0	0	0	0	0	0	0	0
Red Grouper	*Epinephelus morio*	0	0	0	1	1	1	1	0	0	1	1	0
Sand Perch	*Diplectrum formosum*	0	0	0	0	0	0	0	0	0	0	0	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE												
Cardinalfish	*Apogon* sp.	0	0	0	0	1	0	0	0	0	0	0	0
Flamefish	*Apogon maculatus*	5	10	1	0	0	1	1	0	2	0	0	3
Twospot Cardinalfish	*Apogon pseudomaculatus*	0	0	0	0	0	0	0	0	2	1	0	0
FAMILY: JACKS	CARANGIDAE												
Amberjack	*Seriola dumerili*	0	10	0	0	0	0	0	0	1	1	3	1
Blue Runner	*Caranx crysos*	0	0	0	0	0	0	0	0	0	0	0	0
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	1	0	1	1	0
Yellow Jack	*Caranx bartholomaei*	0	0	0	0	0	0	0	0	0	0	0	0

Table 14: Fishes counted on Control Reef 2 at each sample date.

FISHES: CONTROL REEF 2													
COMMON NAME	FISHES	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	*Ocyurus chrysurus*	0	0	1	1	1	1	1	0	0	0	0	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	15	11	1	0	1	200	2	2	0	7	4	25
Lane Snapper	*Lutjanus synagris*	3	1	1	0	0	2	2	0	1	0	0	1
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MOJARRAS	GERREIDAE												
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE												
Cottonwick	*Haemulon melanurum*	0	0	0	1	0	0	0	0	0	3	1	0
White Grunt	*Haemulon plumieri*	3	2	5	2	4	3	2	2	0	1	3	0
Tomtates	*Haemulon aurolineatum*	50	30	10	0	0	0	0	10	200	200	500	30
Juvenile Grunts	*Haemulon juveniles*	100	100	0	0	0	0	0	0	0	20	0	30
Margate	*Haemulon album*	1	0	0	0	0	0	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	3	0	0	1	1	0	2	1	1	0	25	0
Spanish Grunt	*Haemulon macrostomum*	0	0	0	0	0	0	0	0	0	0	0	0
Bluestripe Grunt	*Haemulon sciurus*	0	2	1	0	2	2	2	6	2	1	1	1
Sailors Choice	*Haemulon parra*	0	0	1	0	0	0	0	1	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	1	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	4	16	3	1	3	3	3	1	1	1	1	0
Pigfish	*Orthopristis chrysoptera*	1	1	8	50	3	0	50	20	20	6	30	100
FAMILY: PORGIES	SPARIDAE												
Pinfish	*Logodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0	0
Sportail Pinfish	*Diplodus holbrooki*	0	0	3	1	0	0	0	1	0	1	0	1
Saucereye Porgy	*Calamus calamus*	0	0	0	0	0	0	0	0	0	0	0	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Sheepshead Porgy	*Calamus penna*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE												
Highhat	*Equetus acuminatus*	2	1	0	1	1	0	4	2	2	5	0	0
Cubbyu	*Equetus umbrosus*	0	0	0	0	0	0	0	0	0	0	0	0

Table 14: Continued

FISHES: CONTROL REEF 2													
COMMON NAME	FISHES	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: GOATFISHES	MULLIDAE												
Spotted Goatfish	*Pseudupeneus maculatus*	3	1	1	0	0	0	1	1	0	2	0	0
Yellow Goatfish	*Mulloidichthys martinicus*	6	1	0	0	0	0	0	0	0	1	10	0
FAMILY: SEA CHUBS	KYPHOSIDAE												
Bermuda Chub	*Kyphosus sectatrix*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: BUTTERFLY FISHES	CHAETODONTIDAE												
Reef Butterflyfish	*Chaetodon sedentarius*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE												
Spadefish	*Chaetodipterus faber*	2	2	0	0	11	6	0	0	0	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE												
Queen Angelfish	*Holacanthus ciliaris*	0	0	0	1	0	1	0	0	0	0	0	0
Blue Angelfish	*Holacanthus bermudensis*	0	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	*Pomacanthus paru*	2	0	1	0	0	0	0	0	0	0	0	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	0	1	1	2	0	1	0	0	0
Angelfish Juvenile	*Pomacanthus sp. (juv.)*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DAMSELFISHES	POMACENTRIDAE												
Sergeant Major	*abudefduf saxatilis*	0	1	3	2	2	2	2	1	0	0	0	0
Dusky Damselfish	*Stegates fuscus*	0	0	0	0	0	0	0	0	0	0	0	0
Threespot Damselfish	*Stegastes planifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Beaugregory	*Stegastes leucostictus*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	*Lachnolaimus maximus*	0	0	0	0	0	0	0	0	0	0	0	0
Spanish Hogfish	*Bodianus rufus juvenile*	0	0	0	0	0	0	0	0	0	0	0	0
Clown wrasse	*Halichores maculipinna*	2	3	3	2	2	3	1	2	3	5	2	2
Slippery Dick	*Halichores bivittatus*	0	0	2	3	2	1	1	2	1	2	1	2
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	1	1	0	0	0	0	1	0	0	2	1	1
Bluehead Wrasse	*Thalassoma bifasciatum*	1	1	0	0	0	0	1	2	2	2	2	0

TABLE 14: Continued

FISHES: CONTROL REEF 2													
COMMON NAME	FISHES	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	SCARIDAE	0	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp. (juv.)*	5	0	0	0	0	0	0	0	0	0	0	0
Red tail Parrotfish	*Sparisoma chrospterum*	0	1	0	0	0	0	1	0	0	0	0	1
Stoplight Parrotfish	*Sparisoma viride*	0	2	0	0	0	1	1	1	0	0	0	0
Redfin Parrotfish	*Sparisoma rubripinne*	0	0	1	0	2	0	1	0	0	0	0	0
Redband Parrot	*Sparisoma aurofrenatum*	0	0	0	1	0	2	0	0	1	1	2	1
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	*Dactyloscopus sp. (?)*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CLINIDS	CLINIDAE												
Clinid	*Labrisomus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae A	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae B	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: COMBTOOTH BLENNIE	BLENNIDAE												
Blenny	Blennidae	0	0	0	0	0	0	0	0	1	1	0	0
Molly Miller	*Starella cristata*	0	0	0	0	0	0	0	0	0	0	0	0
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0	0
Hairy Blenny	*Labrisomus nuchipinnis*	0	0	0	0	0	0	0	0	0	0	0	0
Seaweed Blenny	*Parablennius marmoreus*	0	0	0	0	0	0	0	0	0	0	0	0
Barred Blenny	*Hypleurochilus bermudensis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Corphopterus glaucofraenum*	1	4	0	0	0	0	0	0	1	1	3	1
Masked Goby	*Coryphopterus personatus*	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae A	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae B	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 14: Continued

FISHES: CONTROL REEF 2													
COMMON NAME	FISHES	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	*Acanthurus bahianus*	3	2	3	5	3	1	3	15	10	0	6	8
Doctorfish	*Acanthurus chirurgus*	0	2	1	0	1	1	0	1	0	2	0	0
Blue tang	*Acanthurus coeruleus*	1	0	0	0	0	0	0	0	0	0	1	0
FAMILY: MACKERAL	*SCOMBRIDAE*												
Cero	*Scomberomorus regalis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	*SCORPAENIDAE*												
Spotted Scorpionfish	*Scorpaena plumieri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDERS	BOTHIDAE												
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE												
Filefish	*Aluteus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Scrawled Filefish	*Aluterus scriptus*	0	1	0	0	0	0	0	0	0	0	0	0
Orange Filefish	*Aluterus schoepfi*	0	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes capriscus*	1	2	0	0	1	1	1	0	0	1	0	0
FAMILY: BOXFISHES	*OSTRACIIDAE*												
Scrawled cowfish	*Lactophrys quadricornis*	0	0	0	0	1	0	0	0	0	0	0	0
Spotted trunkfish	*Lactophrys trigonus*	0	0	0	0	0	0	0	0	0	0	0	0
Smooth trunkfish	*Lactophrys triqueter*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	*Canthigaster rostrata*	1	0	0	0	0	0	0	0	0	1	0	0
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	*Diodon hystrix*	0	0	0	0	0	0	0	0	0	0	0	0
Balloonfish	*Diodon holocanthus*	0	0	0	0	0	1	0	0	0	0	0	0
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	0	0	0	0	0	0	0	0

Table 14: Continued

FISHES: EXPERIMENTAL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	*Ocyurus chrysurus*	2	0	1	0	0	1	1	1	0	0	0	0
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	20	3	10	2	8	3	2	5	5	11	5	3
Lane Snapper	*Lutjanus synagris*	7	0	1	0	0	0	1	0	0	0	0	0
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MOJARRAS	GERREIDAE												
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE												
Cottonwick	*Haemulon melanurum*	0	10	1	0	1	0	0	7	4	2	0	0
White Grunt	*Haemulon plumieri*	2	20	5	1	5	3	8	3	1	1	2	3
Tomtates	*Haemulon aurolineatum*	50	15	80	11	12	20	30	20	50	500	500	50
Juvenile Grunts	*Haemulon juveniles*	0	0	25	0	0	0	0	0	0	30	0	100
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	3	2	6	5	4	15	5	20	15	6	100	13
Spanish Grunt	*Haemulon macrostomum*	0	0	0	0	0	3	0	1	0	0	0	0
Bluestripe Grunt	*Haemulon sciurus*	2	0	3	1	1	0	5	0	0	0	1	0
Sailors Choice	*Haemulon parrai*	0	0	0	0	0	0	1	1	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	6	10	4	8	1	3	2	1	2	2	1	1
Pigfish	*Orthopristis chrysoptera*	10	0	1	20	40	0	9	20	0	5	20	1
FAMILY: PORGIES	SPARIDAE												
Pinfish	*Lagodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0	0
Spottail Pinfish	*Diplodus holbrooki*	1	0	3	0	0	0	0	0	1	0	0	0
Saucereye Porgy	*Calamus calamus*	0	1	0	0	0	0	0	0	0	0	0	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Sheepshead Porgy	*Calamus penna*	0	0	0	0	0	0	1	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE												
Highhat	*Equetus acuminatus*	0	0	0	0	0	0	0	0	1	0	1	1
Cubbyu	*Equetus umbrosus*	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 15: Continued

FISHES: EXPERIMENTAL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-26-95	8-7-95
FAMILY: GOATFISHES	MULLIDAE												
Spotted Goatfish	*Pseudupeneus maculatus*	2	1	1	0	0	0	0	0	0	0	0	0
Yellow Goatfish	*Mulloidichthys martinicus*	50	4	0	0	0	0	1	0	0	0	0	6
FAMILY: SEA CHUBS	*KYPHOSIDAE*												
Bermuda Chub	*Kyphosus sectatrix*	0	0	0	0	0	0	0	0	0	0	0	1
FAMILY: SPADEFISHES	EPHIPPIDAE												
Spadefish	*Chaetodipterus faber*	0	6	5	0	11	0	8	8	5	3	1	4
FAMILY: BUTTERFLY FISHES	*CHAETODONTIDAE*												
Reef Butterflfish	*Chaetodon sedentarius*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE												
Queen Angelfish	*Holocanthus ciliaris*	1	0	0	0	0	0	0	0	0	0	0	1
Blue Angelfish	*Holocanthus bermudensis*	0	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	*Pomacanthus paru*	1	0	0	0	0	0	0	1	0	0	1	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	1	0	2	0	0	0	1	0	0	0
Angelfish Juvenile	*Pomacanthus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DAMSELFISHES	POMACENTRIDAE												
Sergeant Major	*Abudefduf saxatilis*	0	0	0	0	0	0	0	0	0	1	0	0
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	0	0	0	0	0	0	0	0
Threespot Damselfish	*Stegastes planifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Beaugregory	*Stegastes leucostictus*	0	0	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	*Lachnolaimus maximus*	0	0	0	0	0	0	0	0	0	0	0	0
Spanish Hogfish	*Bodianus rufus*	0	0	0	0	0	0	0	0	0	0	0	0
Clown wrasse	*Halichores maculipinna*	4	0	2	0	0	1	1	2	1	3	1	2
Slippery Dick	*Halichores bivittatus*	0	3	1	3	1	2	3	3	1	0	3	3
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	0	0	0	0	0	0	0	0	1	1	0	0
Bluehead Wrasse	*Thalassoma bifasciatum*	2	1	0	1	1	0	0	0	1	0	0	0
		0	0	1	0	0	0	0	5	5	2	6	7

TABLE 15: Continued

FISHES: EXPERIMENTAL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	Scaridae	0	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp.*	1	0	0	0	0	0	0	0	0	0	0	0
Red tail Parrotfish	*Sparisoma chrospterum*	0	0	0	0	0	0	0	0	0	0	2	0
Redfin Parrotfish	*Sparisoma rubripinne*	0	0	0	0	0	0	0	0	0	0	0	0
Stoplight Parrotfish	*Sparisoma viride*	2	2	1	1	0	1	0	1	0	0	0	0
Redband Parrot	*Sparisoma aurofrenatum*	0	0	0	1	0	0	0	0	0	4	1	4
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	*Dactyloscopus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CLINIDS	CLINIDAE												
Clinid	Labrisomus sp.	0	0	0	1	0	0	0	0	0	0	0	0
Clinid	Clinidae	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: COMBTOOTH BLENNIE	BLENNIDAE												
Blenny	Blennidae	1	0	0	0	0	0	0	0	0	0	0	0
Molly Miller	*Starella cristata*	0	0	0	0	0	0	0	0	0	0	0	0
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0	0
Hairy Blenny	*Labrisomus nuchipinnis*	0	0	0	0	0	0	0	0	0	0	0	0
Seaweed Blenny	*Parablennius marmoreus*	0	0	0	0	0	0	0	0	0	0	0	0
Barred Blenny	*Hypleurochilus bermudensis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofraenum*	3	0	1	0	0	1	1	0	0	3	3	0
Masked Goby	*Coryphopterus personatus*	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 15: Continued

FISHES: EXPERIMENTAL 1													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	*Acanthurus bahianus*	3	100	3	7	0	3	6	12	6	3	5	2
Doctorfish	*Acanthurus chirurgus*	0	2	1	0	0	0	0	1	0	1	0	0
Blue tang	*Acanthurus coeruleus*	0	0	1	1	0	1	0	0	0	0	1	1
FAMILY: MACKERAL	*SCOMBRIDAE*												
Cero	*Scomberomorus regalis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	*SCORPAENIDAE*												
Spotted Scorpionfish	*Scorpaena plumieri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDERS	BOTHIDAE												
Gulf Flounder	*Parelichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE												
Filefish	*Aluterus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Scrawled Filefish	*Aluterus scriptus*	0	1	0	0	0	0	0	0	0	0	0	0
Orange Filefish	*Aluterus schoepfi*	0	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes capriscus*	2	3	1	0	6	0	1	0	0	0	0	1
FAMILY: BOXFISHES	*OSTRACIIDAE*												
Scrawled cowfish	*Lactophrys quadricornis*	0	0	0	0	0	0	1	0	1	0	0	0
Spotted trunkfish	*Lactophrys trigonus*	0	0	0	0	0	0	0	0	0	0	0	0
Smooth trunkfish	*Lactophrys triqueter*	0	0	0	0	1	0	0	0	0	1	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	*Canthigaster rostrata*	0	1	0	0	0	0	0	0	0	1	0	1
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	*Diodon hystrix*	0	0	0	0	0	0	0	0	0	0	0	0
Balloonfish	*Diodon holocanthus*	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	0	0	0	0	0	0	0	0

Table 15: Continued

FISHES; EXPERIMENTAL 2													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: STINGRAY	DASYATIDAE												
Southern stingray	*Dasyatis americana*	0	1	0	0	0	0	0	0	0	0	0	0
FAMILY: MORAY EELS	MURAENIDAE												
Green Moray	*Gymnothorax funebris*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Moray	*Gymnothorax moringa*	0	0	0	0	0	0	0	0	0	0	0	0
Purplemouth Moray	*Gymnothorax vicinus*	1	0	0	0	0	0	0	1	1	0	0	0
FAMILY: HERRINGS	CLUPEIDAE												
Clupeid	Clupeid	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY:LIZARDFISHES	SYNODONTIDAE												
Sand Diver	Synodus intermedius	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SQUIRRELFISHES	HOLOCENTRIDAE												
Squirrelfish	*Holocentrus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Squirrelfish	*Holocentrus rufus*	0	0	0	0	0	0	0	0	0	0	0	0
Squirrelfish	*Holocentrus adsensionis*	0	0	0	0	0	0	0	1	2	1	2	2
Blackbar soldierfish	*Myripristis jacobus*	0	0	0	0	0	0	0	0	0	1	0	0
FAMILY: TRUMPETFISHES	AULOSTOMIDAE												
Trumpetfish	*Aulostomus maculatus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA BASSES	SERRANIDAE												
Black Grouper	*Mycteroperca bonaci*	2	2	0	0	0	0	0	0	0	0	0	0
Gag	*Mycteroperca microlepis*	0	0	0	0	0	0	0	0	0	0	0	0
Red Grouper	*Epinephelus morio*	0	0	0	0	0	0	1	0	0	0	0	0
Sand Perch	*Diplectrum formosum*	0	0	1	0	1	1	0	0	0	0	0	0
Harlequin Bass	*Serranus tigrinus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CARDINALFISHES	APOGONIDAE												
Cardinalfish	*Apogon sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Flamefish	*Apogon maculatus*	10	2	3	0	3	0	0	6	0	3	1	1
Twospot Cardinalfish	*Apogon pseudomaculatus*	1	0	0	0	0	1	1	0	0	4	1	0
FAMILY: JACKS	CARANGIDAE												
Amberjack	*Seriola dumerili*	0	0	0	1	0	0	0	2	0	0	0	7
Blue Runner	*Caranx crysos*	0	0	0	0	0	0	0	0	0	0	0	2
Bar Jack	*Caranx ruber*	0	0	0	0	0	0	0	0	0	0	2	0
Yellow Jack	*Caranx bartholomaei*	0	0	0	0	0	0	0	0	0	0	0	0

Table 16: Fishes counted on reef E2 on each sample date.

FISHES: EXPERIMENTAL 2													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SNAPPERS	LUTJANIDAE												
Yellowtail Snapper	*Ocyurus chrysurus*	1	0	0	1	0	1	0	0	1	0	0	1
Mahogany Snapper	*Lutjanus mahogani*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Snapper	*Lutjanus griseus*	7	2	2	2	3	1	3	0	50	0	4	5
Lane Snapper	*Lutjanus synagris*	3	0	0	1	0	0	0	1	3	1	0	0
Mutton Snapper	*Lutjanus analis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: MOJARRAS	GERREIDAE												
Yellowfin Mojarra	*Gerres cinereus*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: GRUNTS	HAEMULIDAE												
Cottonwick	*Haemulon melanurum*	0	0	1	0	0	4	1	0	2	1	2	0
White Grunt	*Haemulon plumieri*	3	2	4	38	5	12	3	3	9	5	7	4
Tomtates	*Haemulon aurolineatum*	100	200	80	20	30	40	100	100	200	700	300	50
Juvenile Grunts	*Haemulon juveniles*	0	0	0	0	0	0	0	50	0	500	0	150
Margate	*Haemulon album*	0	0	0	0	0	0	0	0	0	0	0	0
French Grunt	*Haemulon flavolineatum*	2	1	5	3	2	13	7	7	5	10	30	3
Spanish Grunt	*Haemulon macrostomum*	0	0	0	0	0	0	0	0	0	0	0	0
Bluestripe Grunt	*Haemulon sciurus*	0	1	1	2	0	1	0	0	1	0	4	3
Sailors Choice	*Haemulon parrai*	0	0	0	0	0	2	0	0	0	0	0	0
Black Margate	*Anisotremus surinamensis*	0	0	0	0	0	0	0	0	0	0	0	0
Porkfish	*Anisotremus virginicus*	1	2	1	1	2	1	1	1	2	3	1	1
Pigfish	*Orthopristis chrysoptera*	0	0	6	0	0	0	0	0	0	0	20	0
FAMILY: PORGIES	SPARIDAE												
Pinfish	*Lagodon rhomboides*	0	0	0	0	0	0	0	0	0	0	0	0
Spottail Pinfish	*Diplodus holbrooki*	0	0	1	0	0	0	0	0	0	0	0	3
Saucereye Porgy	*Calamus calamus*	1	0	0	0	0	1	0	0	0	0	1	0
Grass Porgy	*Calamus arctifrons*	0	0	0	0	0	0	0	0	0	0	0	0
Sheepshead Porgy	*Calamus penna*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DRUMS	SCIAENIDAE												
Highhat	*Equetus acuminatus*	1	0	0	0	0	0	0	0	0	0	0	0
Cubbyu	*Equetus umbrosus*	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 16: Continued

FISHES: EXPERIMENTAL 2													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: GOATFISHES	MULLIDAE												
Spotted Goatfish	*Pseudupeneus maculatus*	0	0	1	1	1	0	0	0	0	0	1	0
Yellow Goatfish	*Mulloidichthys martinicus*	8	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SEA CHUBS	KYPHOSIDAE												
Bermuda Chub	*Kyphosus sectatrix*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPADEFISHES	EPHIPPIDAE												
Spadefish	*Chaetodipterus faber*	0	0	0	8	11	0	0	0	0	0	0	0
FAMILY: BUTTERFLYFISHES	CHAETODONTODAE												
Reef Butterflyfish	*Chaetodon sedentarius*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: ANGELFISHES	POMACANTHIDAE												
Queen Angelfish	*Holocanthus ciliaris*	0	1	0	0	0	0	0	0	0	0	0	0
Blue Angelfish	*Holocanthus bermudensis*	0	0	0	0	0	0	0	0	0	0	0	0
French Angelfish	*Pomacanthus paru*	1	1	0	0	0	0	1	1	0	0	0	0
Grey Angelfish	*Pomacanthus arcuatus*	0	0	0	1	0	3	5	1	1	1	0	1
Angelfish Juvenile	*Pomacanthus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: DAMSELFISHES	POMACENTRIDAE												
Sergeant Major	*Abudefduf saxatilis*	0	0	0	0	0	0	0	0	0	0	0	0
Dusky Damselfish	*Stegastes fuscus*	0	0	0	0	1	1	1	1	1	1	1	0
Threespot Damselfish	*Stegastes planifrons*	1	0	1	1	0	0	0	0	0	0	0	0
Beaugregory	*Stegastes leucostictus*	1	1	0	0	0	0	0	0	0	0	0	0
Blue Chromis	*Chromis cyanis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: WRASSES	LABRIDAE												
Hogfish	*Lachnolaimus maximus*	0	0	0	0	0	0	0	0	0	0	0	0
Spanish Hogfish	*Bodianus rufus*	0	0	0	0	0	1	0	0	0	1	1	1
Clown wrasse	*Halichores maculipinna*	6	4	5	0	3	4	0	4	4	3	1	3
Slippery Dick	*Halichores bivittatus*	0	6	6	0	2	1	3	2	1	3	3	2
Yellowcheek wrasse	*Halichores cyanocephalus*	0	0	0	0	0	0	0	0	0	0	0	0
Puddingwife	*Halichores radiatus*	1	0	0	0	0	1	0	0	0	0	0	0
Bluehead Wrasse	*Thalassoma bifasciatum*	5	0	1	1	1	4	2	7	2	5	9	4

TABLE 16: Continued

FISHES: EXPERIMENTAL 2													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: PARROTFISHES	SCARIDAE												
Parrotfish	Scaridae	0	0	0	0	0	0	0	0	0	0	0	0
Parrotfish	*Sparisoma sp.*	2	0	0	0	0	0	0	0	0	0	0	0
Red tail Parrotfish	*Sparisoma chrospterum*	0	0	0	1	0	0	0	0	1	0	0	0
Redfin Parrot	*Sparisoma rubripinne*	0	0	0	0	0	0	0	0	0	0	0	0
Stoplight Parrotfish	*Sparisoma viride*	0	0	0	0	0	0	0	1	0	0	0	0
Redband Parrot	*Sparisoma aurofrenatum*	1	1	1	0	0	0	0	0	0	4	0	0
FAMILY: BARRACUDAS	SPHYAENIDAE												
Barracuda	*Sphyraena barracuda*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: STARGAZER	DACTYLOSCOPIDAE												
Stargazer	*Dactyloscopus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: CLINIDS	CLINIDAE												
Clinid	Labrisomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae	0	0	0	0	0	0	0	0	0	0	0	0
Clinid	Clinidae	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: COMBTOOTH BLENNIES	BLENNIDAE												
Blenny	Blennidae	1	0	0	0	0	0	0	0	1	0	0	0
Molly Miller	*Scartella cristata*	0	0	0	0	1	0	0	0	0	0	0	0
Redlip Blenny	*Ophioblennius atlanticus*	0	0	0	0	0	0	0	0	0	0	0	0
Hairy Blenny	*Labrisomus nuchipinnis*	0	0	0	0	0	1	0	0	0	0	0	0
Seaweed Blenny	*Parablennius marmoreus*	0	0	0	0	0	0	0	1	0	1	0	0
Barred Blenny	*Hypleurochilus bermudensis*	0	0	0	0	0	0	0	1	0	0	0	0
FAMILY: GOBIES	GOBIIDAE												
Neon Goby	*Gobiosoma oceanops*	0	0	0	0	0	0	0	0	0	0	0	0
Bridled Goby	*Coryphopterus glaucofraenum*	3	0	1	0	0	0	1	4	2	7	5	1
Masked Goby	*Coryphopterus personatus*	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae	0	0	0	0	0	0	0	0	0	0	0	0
Goby	Gobiidae	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 16: Continued

FISHES: EXPERIMENTAL 2													
COMMON NAME	SCIENTIFIC NAME	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
FAMILY: SURGEONFISHES	ACANTHURIDAE												
Ocean Surgeon	*Acanthurus bahianus*	7	30	2	5	4	0	2	4	7	3	7	7
Doctorfish	*Acanthurus chirurgus*	0	1	0	0	3	2	1	2	1	2	0	0
Blue tang	*Acanthurus coeruleus*	0	0	0	0	0	0	0	0	0	0	0	1
FMILY: MACKERAL	SCOMBRIDAE												
Cero	*Scomberomorus regalis*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SCORPIONFISH	SCORPAENIDAE												
Spotted Scorpionfish	*Scorpaena plumieri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEFTEYE FLOUNDERS	BOTHIDAE												
Gulf Flounder	*Paralichthys albigutta*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: LEATHERJACKETS	BALISTIDAE												
Filefish	*Aluterus sp.*	0	0	0	0	0	0	0	0	0	0	0	0
Scrawled Filefish	*Aluterus scriptus*	0	1	0	0	0	0	0	0	0	0	0	1
Orange Filefish	*Aluterus schoepfi*	0	0	0	0	0	0	0	0	0	0	0	0
Orangespotted Filefish	*Cantherhines pullus*	0	0	0	0	0	0	0	0	0	0	0	0
Whitespotted Filefish	*Cantherhines macrocerus*	0	0	0	0	0	0	0	0	0	0	0	0
Grey Trigger	*Balistes capriscus*	2	3	0	0	0	1	1	0	0	0	1	1
FAMILY: BOXFISHES	OSTRACIIDAE												
Scrawled cowfish	*Lactrophrys quadricornis*	0	0	0	0	0	0	0	0	0	0	0	0
Spotted trunkfish	*Lactrophrys trigonus*	0	0	0	0	0	0	0	0	0	0	0	0
Smooth trunkfish	*Lactrophrys triquater*	0	0	0	0	0	0	0	0	0	1	0	0
FAMILY: PUFFERS	TETRAODONTIDAE												
Sharpnose Puffer	*Canthigaster rostrata*	0	0	0	0	0	0	0	1	0	1	0	0
Bandtail Puffer	*Sphoeroides spengleri*	0	0	0	0	0	0	0	0	0	0	0	0
FAMILY: SPINY PUFFERS	DIODONTIDAE												
Porcupinefish	*Diodon hystrix*	0	1	0	0	0	0	0	0	0	0	0	0
Balloonfish	*Diodon holocanthus*	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Juveniles	UNID. JUVENILES	0	0	0	0	0	0	0	0	0	0	0	0

Table 16: Continued

DATE	REEF C1 # FISH	# SPECIES	REEF C2 # FISH	# SPECIES	REEF E1 # FISH	# SPECIES	REEF E2 # FISH	# SPECIES	TOTALS # FISH	# SPECIES
YEAR 1										
4-7-93	13	5	10	6	22	5	9	7	54	8
4-12-93	10	5	15	3	11	3	26	7	62	12
4-20-93	14	7	35	9	52	12	19	8	120	19
4-27-93	12	6	10	7	24	7	37	12	83	15
5-8-93	36	9	39	9	36	10	59	11	170	20
5-22-93	42	16	37	13	33	15	35	14	147	27
6-9-93	21	14	27	14	35	18	40	16	123	30
6-23-93	37	18	29	15	37	14	36	13	139	26
7-7-93	43	17	40	18	43	19	47	15	173	30
7-22-93	52	20	56	18	50	21	79	16	237	39
8-6-93	26	17	52	15	62	16	59	22	199	36
YEAR 2										
9-10-93	59	22	44	23	44	20	78	20	225	40
10-18-93	68	25	99	21	58	22	105	25	330	49
11-19-93	30	14	59	25	38	19	55	18	182	45
12-5-93	39	18	64	24	73	21	41	18	217	39
1-30-94	37	10	65	20	45	18	45	17	192	32
2-12-94	24	12	66	28	56	13	85	24	231	36
3-18-94	16	9	50	18	53	19	80	15	199	33
4-4-94	65	20	52	20	66	21	105	19	288	36
5-10-94	66	24	31	20	52	24	81	23	230	42
6-24-94	41	14	56	18	49	20	65	21	211	39
7-17-94	59	22	82	26	101	21	140	28	382	42
8-6-94	97	20	50	14	95	21	75	26	317	44
MEAN YEAR1	27.82	12.18	31.82	11.55	36.82	12.73	40.55	12.82	137.00	23.82
MEAN YEAR2	50.08	17.50	59.83	21.42	60.83	19.92	79.58	21.17	250.33	39.75

Table 17: Summary of the number of fishes and species identified on each reef and combined totals.

DATE	REEF C1 # FISH	# SPECIES	REEF C2 # FISH	# SPECIES	REEF E1 # FISH	# SPECIES	REEF E2 # FISH	# SPECIES	TOTALS # FISH	# SPECIES
YEAR 3										
9-23-94	93	22	116	24	72	25	172	26	453	40
10-20-94	72	26	110	27	63	20	97	22	342	42
11-22-94	74	20	51	20	62	28	43	19	230	37
12-27-94	51	11	72	15	63	15	87	17	273	33
1-17-95	80	13	44	20	95	16	73	16	292	31
3-1-95	72	15	34	20	59	15	97	22	262	38
3-19-95	71	18	87	24	90	21	84	17	332	42
4-23-95	79	20	75	20	116	21	152	23	422	40
5-16-95	99	21	105	19	108	19	147	21	459	38
6-13-95	162	25	122	28	139	24	162	24	585	41
7-25-95	124	26	150	22	160	22	154	21	588	37
8-7-95	151	22	159	17	169	27	154	23	633	43
MEAN YEAR3	94.00	19.92	93.75	21.33	99.67	21.08	118.50	20.92	405.92	38.50
MEAN TOTAL	54.18	15.71	58.58	17.26	62.27	17.04	75.46	17.44	250.50	34.03

Table 18: Year 3 summary of the number of fishes and species identified on each reef with combined totals. Mean number of fishes and species are shown for year 3 data and for all three years.

REEFS	DATE SAMPLED									
	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
CONTROL 1										
NO. SPECIES	5	7	6	9	16	14	18	17	20	17
NO. FISH	20	64	12	66	457	174	237	93	252	226
DIVERSITY	0.5052	0.3683	0.6687	0.5842	0.4512	0.3196	0.3445	0.7544	0.4382	0.2838
VARIANCE	0.0058	0.0042	0.0077	0.0030	0.0006	0.0024	0.0018	0.0039	0.0019	0.0019
CONTROL 2										
NO. SPECIES	3	9	7	9	13	14	15	18	18	15
NO. FISH	65	185	310	89	87	129	129	90	116	52
DIVERSITY	0.2848	0.3612	0.0856	0.6071	0.6504	0.4481	0.4721	0.7979	0.7761	0.9358
VARIANCE	0.0017	0.0018	0.0005	0.0025	0.0037	0.0033	0.0036	0.0045	0.0030	0.0042
EXP. 1										
NO. SPECIES	3	12	7	10	15	18	14	19	21	16
NO. FISH	11	62	224	186	383	435	537	1043	350	62
DIVERSITY	0.3299	0.9058	0.2125	0.3733	0.3802	0.4895	0.1747	0.1196	0.3399	0.9160
VARIANCE	0.0094	0.0019	0.0010	0.0018	0.0009	0.0006	0.0005	0.0002	0.0013	0.0041
EXP. 2										
NO. SPECIES	7	8	12	11	14	16	13	15	16	22
NO. FISH	126	519	237	469	235	340	236	147	279	259
DIVERSITY	0.3232	0.09319	0.318	0.4621	0.3119	0.2853	0.3027	0.5483	0.5099	0.4942
VARIANCE	0.0019	0.00031	0.00146	0.0005	0.0016	0.0012	0.0014	0.0027	0.0014	0.002

Table 19: Year 1 Shannon index of diversity for each reef and sample date.

REEFS	DATE SAMPLED											
	9-10-93	10-18-93	11-19-93	12-5-93	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
CONTROL 1												
NO. SPECIES	22	25	14	18	10	12	9	20	24	14	22	20
NO. FISH	163	71	531	41	37	27	16	168	219	45	59	1097
DIVERSITY	0.682	1.1722	0.1572	1.1007	0.8229	0.9784	0.8586	0.6140	0.6103	0.8448	1.1166	0.2020
VARIANCE	0.003	0.0027	0.0005	0.0034	0.0034	0.0031	0.0055	0.0025	0.0024	0.0058	0.0038	0.0003
CONTROL 2												
NO. SPECIES	23	21	25	24	20	28	18	20	20	18	26	14
NO. FISH	94	99	259	264	65	566	350	52	1082	76	182	1150
DIVERSITY	0.862	0.8445	0.5092	0.5124	1.00721	0.2932	0.3221	1.0376	0.2649	0.9893	0.7767	0.2411
VARIANCE	0.005	0.004	0.0022	0.0002	0.00436	0.0008	0.0012	0.0053	0.0002	0.0026	0.0025	0.0002
EXP. 1												
NO. SPECIES	20	22	19	21	18	13	19	21	24	20	21	21
NO. FISH	94	58	38	73	45	56	53	66	302	79	101	1295
DIVERSITY	0.865	1.2037	1.1304	1.0709	1.1029	0.9079	1.0068	1.0243	0.6437	1.0022	1.0091	0.3676
VARIANCE	0.005	0.002	0.0039	0.0029	0.0028	0.0031	0.0050	0.0042	0.0013	0.0033	0.0024	0.0003
EXP. 2												
NO. SPECIES	20	25	18	18	17	24	15	19	23	21	28	26
NO. FISH	128	155	55	41	44	87	380	405	539	165	140	1175
DIVERSITY	0.851	1.0366	1.0794	1.1098	1.0159	1.1325	0.3937	0.4626	0.5867	0.7115	1.1059	0.3012
VARIANCE	0.003	0.0019	0.0026	0.0031	0.0034	0.0028	0.0010	0.0010	0.0007	0.0028	0.0015	0.0003

Table 20: Year 2 Shannon index of diversity for each reef and sample date.

REEFS	DATE SAMPLED											
	9-23-94	10-20-94	11-22-94	12-27-94	1-17-95	3-1-95	3-19-94	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
CONTROL 1												
NO. SPECIES	22	26	20	11	13	15	18	20	21	25	26	22
NO. FISH	132	72	99	51	80	72	71	79	99	362	124	301
DIVERSITY	0.8827	1.0564	0.9752	0.8372	0.6550	0.5960	0.9230	0.9600	0.8680	0.6420	0.9929	0.6260
VARIANCE	0.003	0.0027	0.0026	0.0033	0.0050	0.0060	0.0040	0.0040	0.0040	0.0010	0.0029	0.0015
CONTROL 2												
NO. SPECIES	24	27	20	15	20	20	24	20	19	28	22	17
NO. FISH	216	210	51	73	44	234	87	75	255	272	600	209
DIVERSITY	0.82417	0.878939	1.149169	0.60742	1.16236	0.35393	0.85407	1.03007	0.43752	0.56603	0.3583	0.7248
VARIANCE	0.00185	0.001962	0.002561	0.006165	0.00318	0.0021	0.00607	0.00293	0.00179	0.00214	0.0007	0.0013
EXP. 1												
NO. SPECIES	25	20	28	15	16	15	21	21	19	24	22	27
NO. FISH	187	197	167	64	95	59	90	116	108	589	660	219
DIVERSITY	1.0151	0.845595	0.911211	0.928921	0.8526	0.89931	1.03403	1.07128	0.8721	0.34907	0.4068	0.8454
VARIANCE	0.00159	0.001982	0.002686	0.002774	0.0025	0.00384	0.00262	0.00143	0.00306	0.0008	0.0006	0.0019
EXP. 2												
NO. SPECIES	26	22	19	17	16	22	17	23	21	24	21	23
NO. FISH	172	263	123	87	73	97	134	202	297	1262	404	254
DIVERSITY	0.81738	0.457832	0.678373	0.796905	0.91533	0.94168	0.52331	0.76124	0.55355	0.42552	0.5137	0.6763
VARIANCE	0.00302	0.001714	0.003921	0.003319	0.00356	0.00342	0.00363	0.00201	0.00145	0.00019	0.0012	0.0018

Table 21: Year 3 Shannon index of diversity for each reef and sample date.

TESTS	DATES SAMPLED										
	4-8-93	4-12-93	4-20-93	4-27-93	5-8-93	5-22-93	6-9-93	6-23-93	7-7-93	7-22-93	8-6-93
C1-C2											
t	-1.703	**2.540**	0.092	**6.454**	-0.310	**-3.048**	-1.707	-1.733	-0.474	**-4.813**	**-8.403**
v (DF)	18.925	32.520	122.018	13.605	145.756	117.810	276.188	255.504	181.483	262.253	103.977
E1-E2											
t	1.138	0.063	**17.409**	-2.110	-1.842	1.366	**4.787**	**-2.876**	**-7.966**	**-3.222**	**5.397**
v (DF)	32.057	15.711	83.953	452.626	286.573	488.020	645.823	419.404	173.894	615.249	132.133
C1-E1											
t	**2.355**	1.421	**-6.917**	**4.889**	**3.028**	1.811	**-3.102**	**3.508**	**9.863**	1.721	**-8.217**
v (DF)	34.902	23.846	111.172	15.482	151.915	773.160	268.784	384.330	104.483	538.053	124.484
C1-E2											
t	**4.837**	**2.077**	**4.110**	**3.672**	**2.070**	**2.977**	0.574	0.734	**2.542**	-1.237	**-3.367**
v(DF)	25.078	34.166	73.800	16.963	88.286	419.457	348.670	467.369	203.210	511.800	484.812
C2-E1											
t	**4.034**	-0.428	**-9.037**	**-3.229**	**3.565**	**3.990**	-0.662	**4.617**	**9.816**	**6.613**	0.218
v (DF)	27.283	15.262	180.367	419.180	215.254	134.560	180.194	169.436	99.528	227.613	112.866
C2-E2											
t	**9.404**	-0.644	**5.885**	**-5.257**	**2.679**	**4.677**	**2.431**	**2.383**	**2.942**	**3.990**	**5.605**
v (DF)	53.643	175.944	252.851	391.550	126.008	166.806	229.099	232.374	187.082	231.711	110.320

Table 22: Year 1 Hutcheson t-test comparisons of Shannon diversity indices by sample date. Comparisons are listed in left column (i.e. C1-C2 compares Control Reef 1 to Control Reef 2). Statistically significant t values are bolded.

TESTS	DATE SAMPLED											
	9-10-93	10-18-9	11-19-9	12-05-9	1-30-94	2-12-94	3-18-94	4-4-94	5-10-94	6-24-94	7-17-94	8-6-94
C1-C2												
t	-2.013	4.003	-6.774	9.805	-2.099	10.932	6.578	-4.795	6.74	-1.576	4.303	-1.731
v (DF)	88.800	166.988	80.671	43.631	99.749	43.052	23.726	104.586	263.455	84.228	142.248	2216.41
E1-E2												
t	0.157	-0.459	-14.672	0.375	1.1	-2.934	7.939	7.801	1.301	3.74	-1.55	2.772
v (DF)	88.800	125.389	47.382	96.425	88.022	133.493	74.889	100.395	607.479	201	208.492	2396.277
C1-E1												
t	-2.046	1.999	-16.563	-0.113	-4.835	1.264	-2.007	-8.244	-0.684	-2.064	1.754	-9.917
v (DF)	134.365	149.450	73.223	79.597	79.342	72.478	46.899	147.036	425.285	93.037	127.875	2348.127
C1-E2												
t	-2.182	-4.637	-7.954	-10.031	-2.345	-2.005	5.803	2.567	0.427	1.439	0.148	-4.043
v(DF)	88.000	156.127	77.152	82.966	95.162	78.002	22.094	310.1	345.93	92.554	108.469	2268.486
C2-E1												
t	-0.030	-2.501	-8.230	-10.399	-1.129	-9.867	-8.696	0.136	-9.79	-0.168	-3.327	-5.765
v (DF)	93.627	177.605	112.422	46.337	109.894	89.528	80.647	111.539	420.342	153.619	262.111	2444.144
C2-E2												
t	0.123	2.676	0.633	-0.502	-0.098	-13.941	-1.542	7.227	-10.758	3.79	-5.213	-2.554
v (DF)	93.627	147.175	80.757	102.976	108.414	143.665	713.8	73.0242	930.553	213.252	317.924	2270.019

Table 23: Year 2 Hutcheson t-test comparisons of Shannon diversity indices by sample date. Comparisons listed in left column (i.e. C1-C2 compares Control Reef 1 to Control Reef 2). Statistically significant t values are bolded.

TESTS	DATE SAMPLED											
	9-23-94	10-20-9	11-22-9	12-27-9	1-17-95	3-1-95	3-19-95	4-23-95	5-16-95	6-13-95	7-25-95	8-7-95
C1-C2												
t	0.840	**2.599**	**-2.422**	**2.362**	**-5.611**	**2.690**	0.687	-0.842	**5.657**	1.356	**10.577**	**-1.867**
v (DF)	280.165	181.776	135.288	122.023	123.388	126.455	156.295	151.468	192.494	503.161	188.813	503.817
E1-E2												
t	-1.954	**3.081**	0.880	-1.177	**-2.794**	**-3.916**	-1.755	-1.759	-0.065	**9.263**	**-2.520**	**2.780**
v (DF)	402.992	406.445	160.254	124.677	148.648	129.130	145.338	133.947	200.680	843.269	788.357	468.196
C1-E1												
t	0.842	**9.010**	**3.676**	0.495	**-2.814**	**-3.561**	**4.576**	**2.564**	**4.259**	**6.279**	**10.884**	**-5.665**
v (DF)	319.289	439.072	259.540	150.392	193.579	143.051	179.858	162.208	176.130	506.445	179.177	482.489
C1-E2												
t	**-3.253**	0.531	**3.285**	**-3.401**	**4.112**	**-7.074**	-1.931	-0.624	-6.243	**3.999**	**7.484**	-0.876
v(DF)	299.042	173.300	220.013	128.798	109.132	131.196	151.183	144.029	237.159	483.490	179.177	482.489
C2-E1												
t	0.097	**6.945**	**5.848**	-1.946	**3.011**	**-7.908**	**3.359**	**3.828**	**-2.038**	**2.912**	**-3.565**	**-2.132**
v (DF)	257.905	180.887	250.637	110.534	112.596	218.403	180.362	181.517	534.427	321.610	1240.712	416.766
C2-E2												
t	**2.911**	**6.378**	**2.865**	1.691	-0.806	-0.497	**6.459**	**5.288**	**4.745**	**-2.426**	**-3.565**	0.871
v (DF)	344.456	458.026	165.683	138.961	153.404	142.265	223.710	314.421	217.119	875.479	824.008	461.087

Table 24: Year 3 Hutcheson t-test comparisons of Shannon diversity indices by sample date. Comparisons listed in left column (i.e. C1-C2 compares Control Reef 1 to Control Reef 2). Statistically significant t values are bolded.

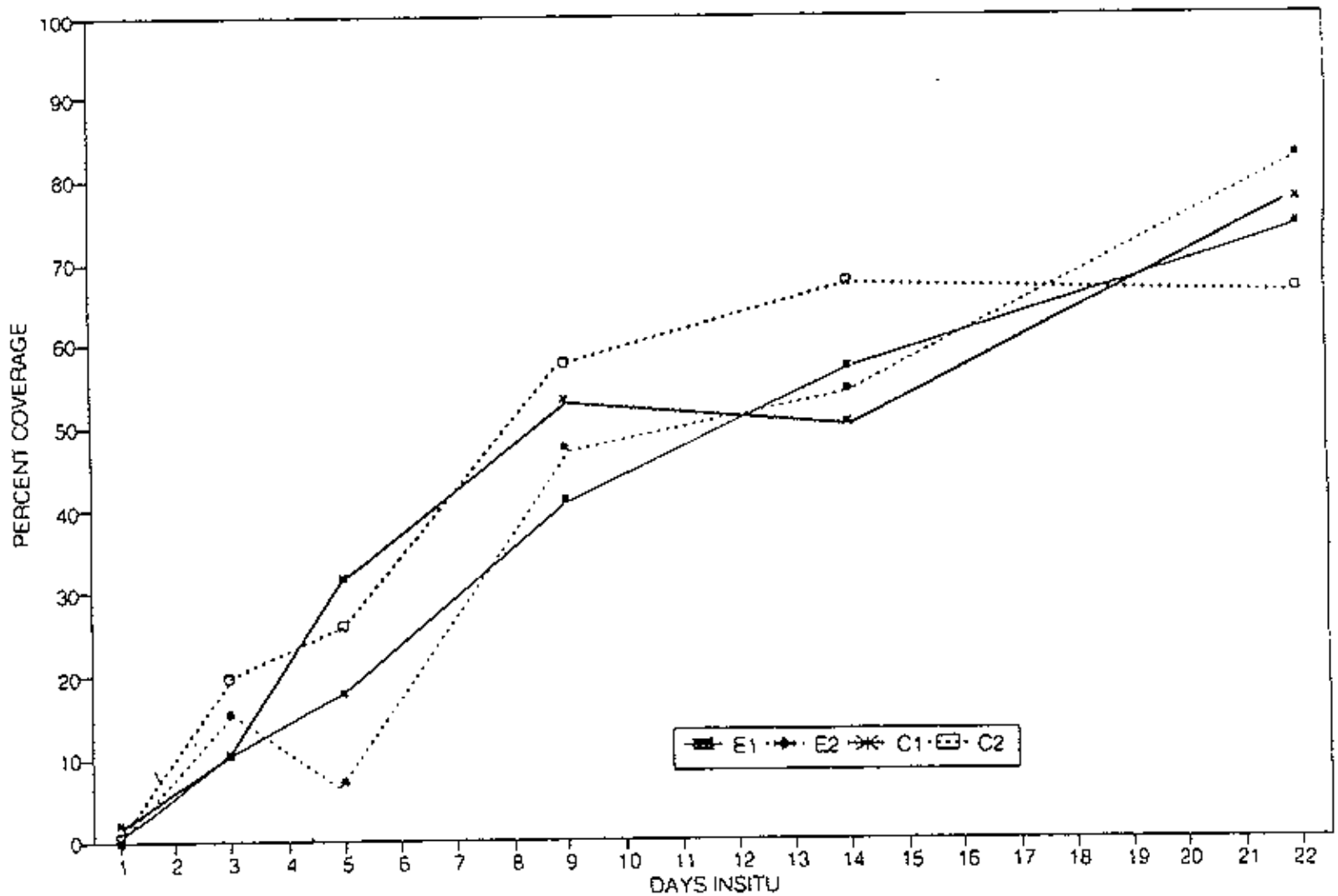

Figure 1: Mean percent organic coverage on all reefs from one day after deployment to 22 days after reef deployment.

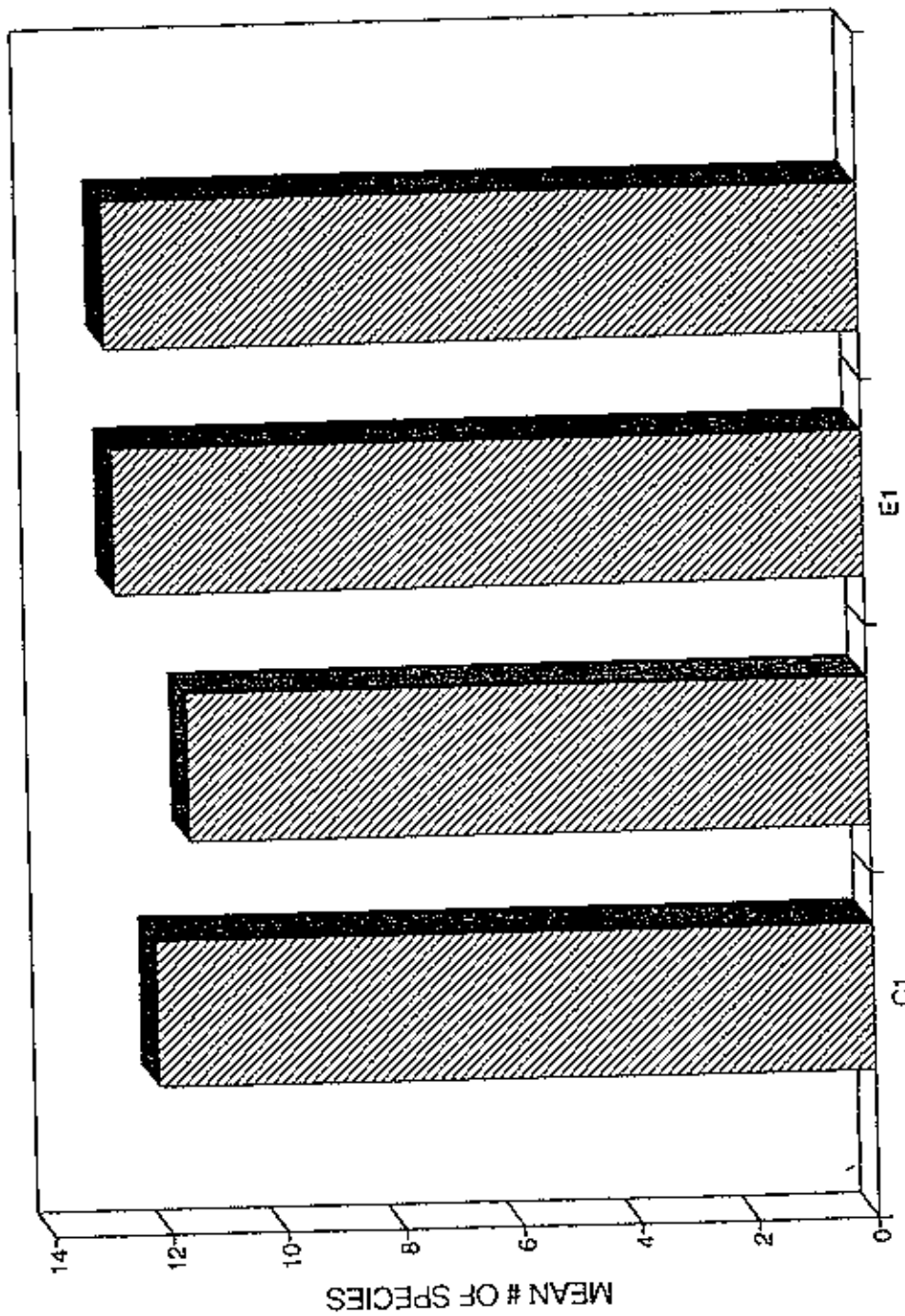

Figure 2: Mean number of species identified on each reef during the first year.

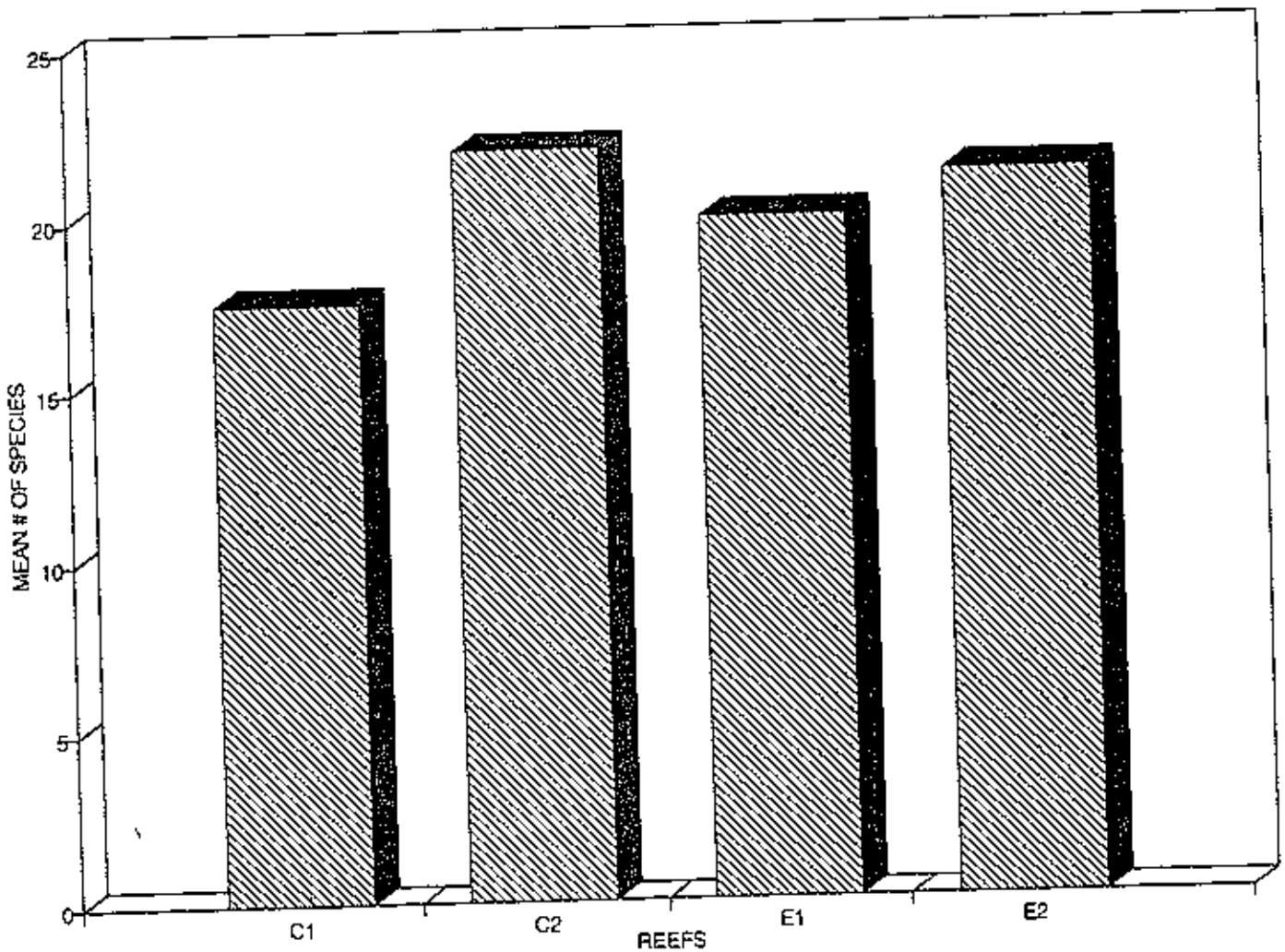

Figure 3: Mean number of species identified on each reef during the second year.

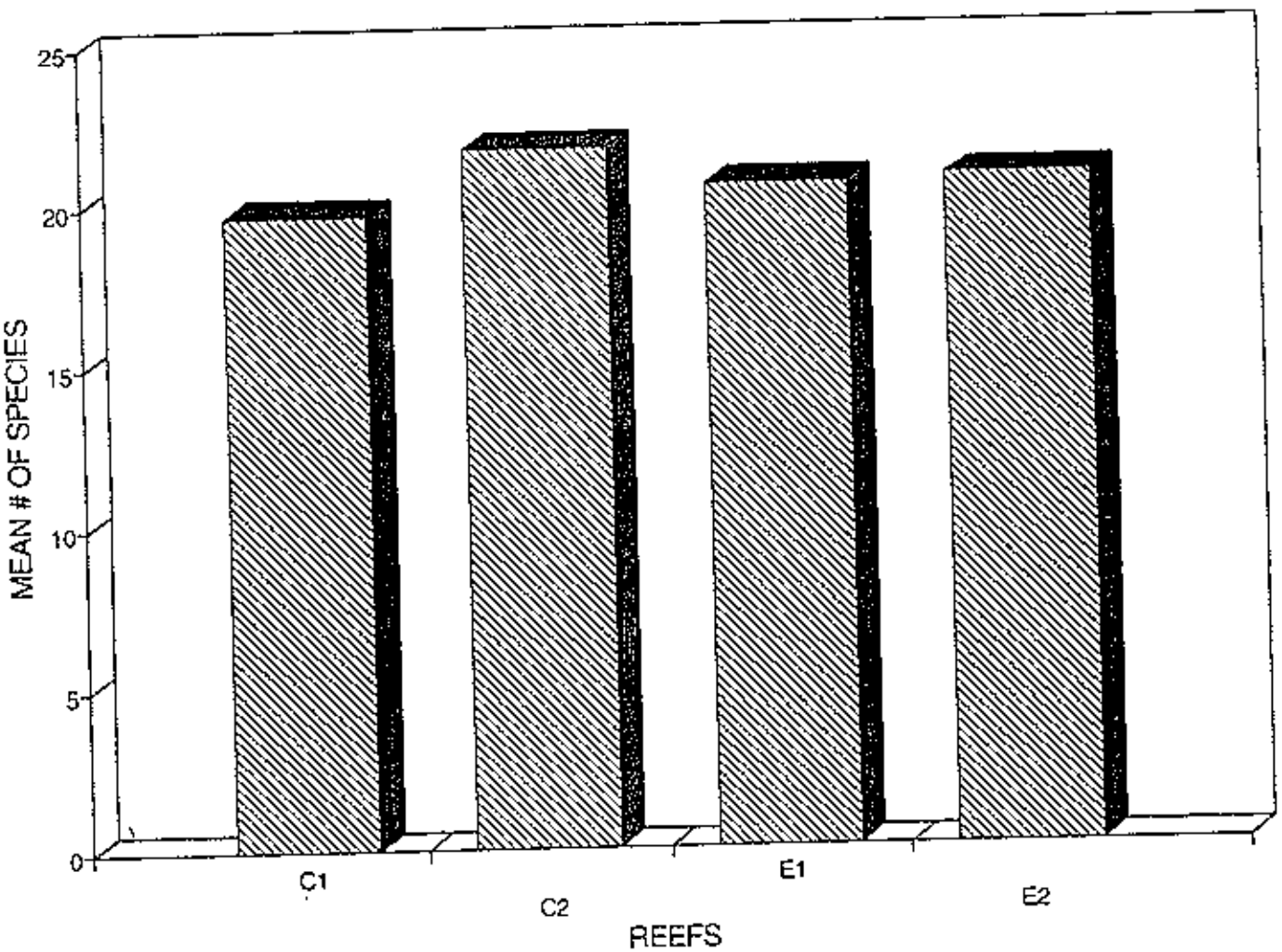

Figure 4: Mean number of species identified on each reef during the third year.

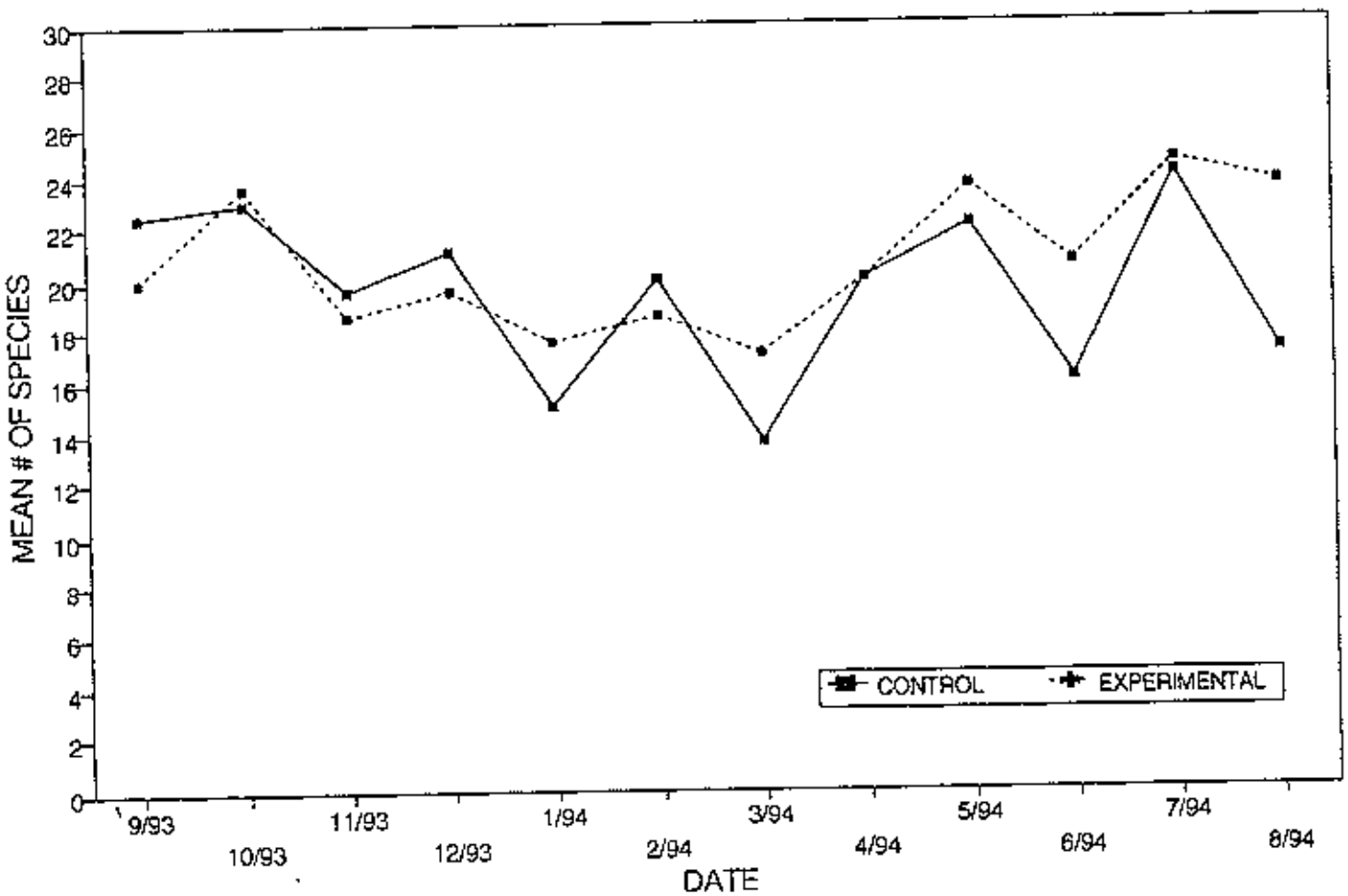

Figure 5: Mean number of species identified on the control and experimental reefs during the first year by date. Replicate reefs have been combined.

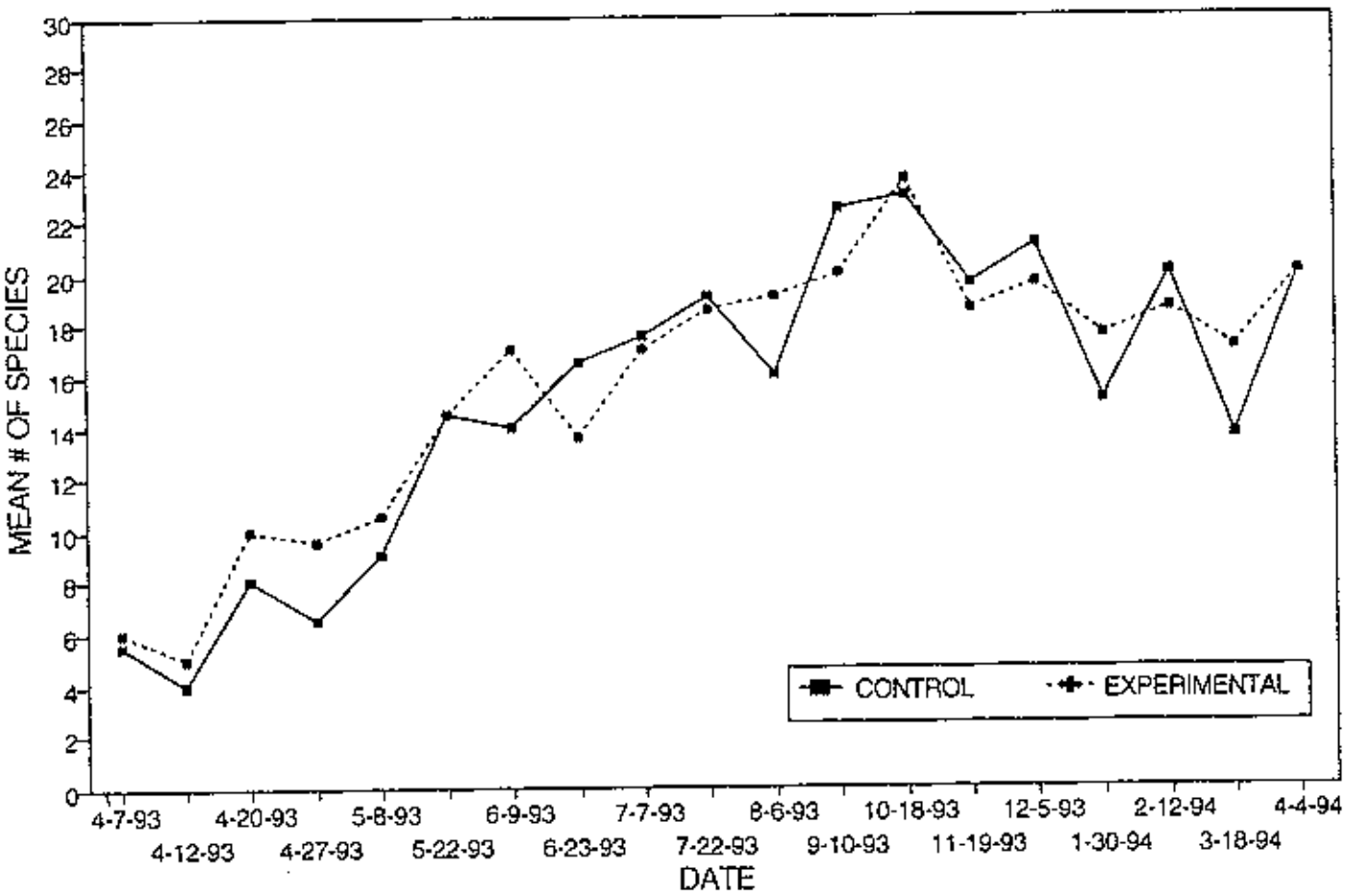

Figure 6: Mean number of species identified on the control and experimental reefs during the second year by date. Replicate reefs have been combined

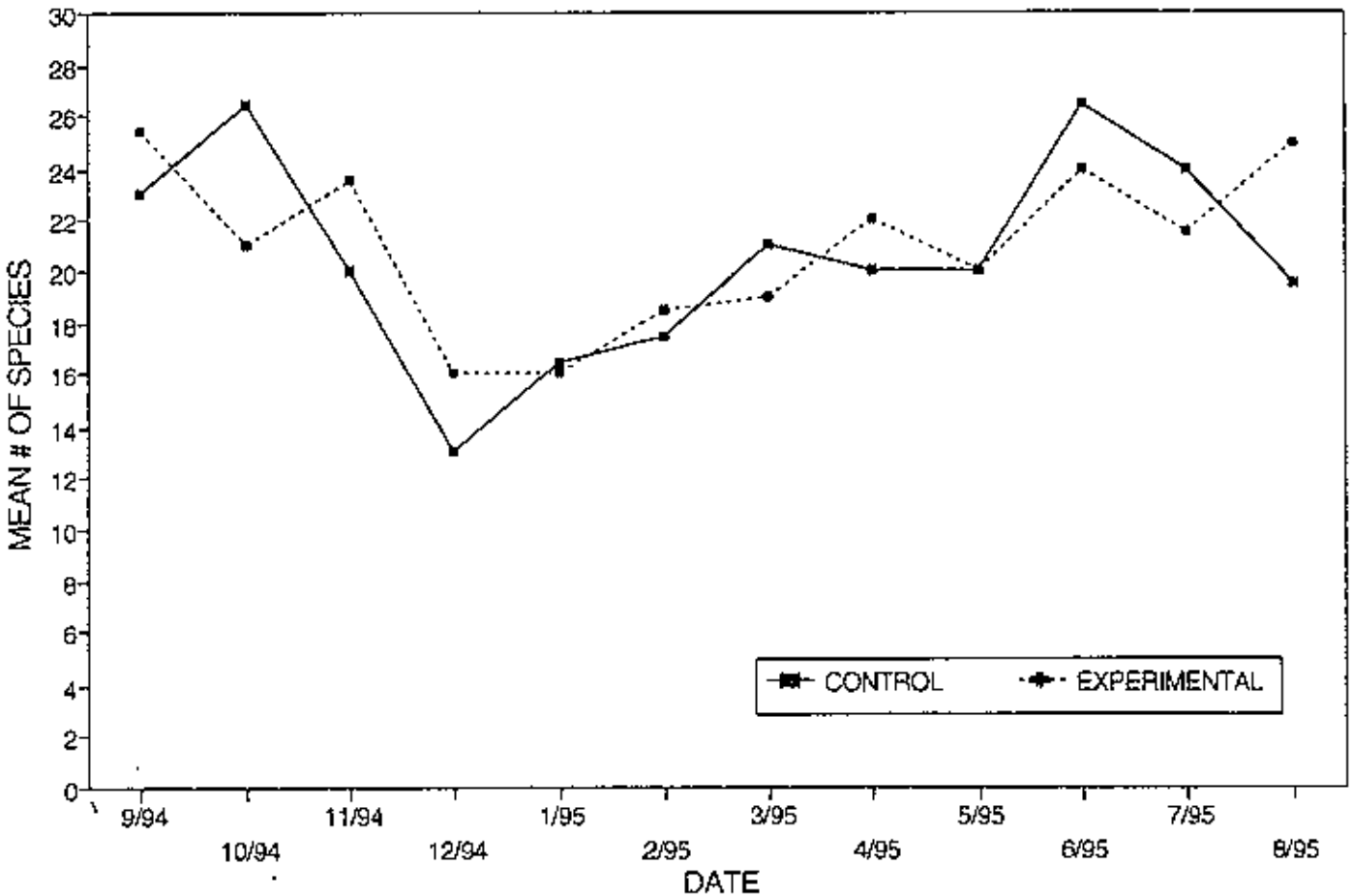

Figure 7: Mean number of species identified on the control and experimental reefs during the third year by date. Replicate reefs have been combined

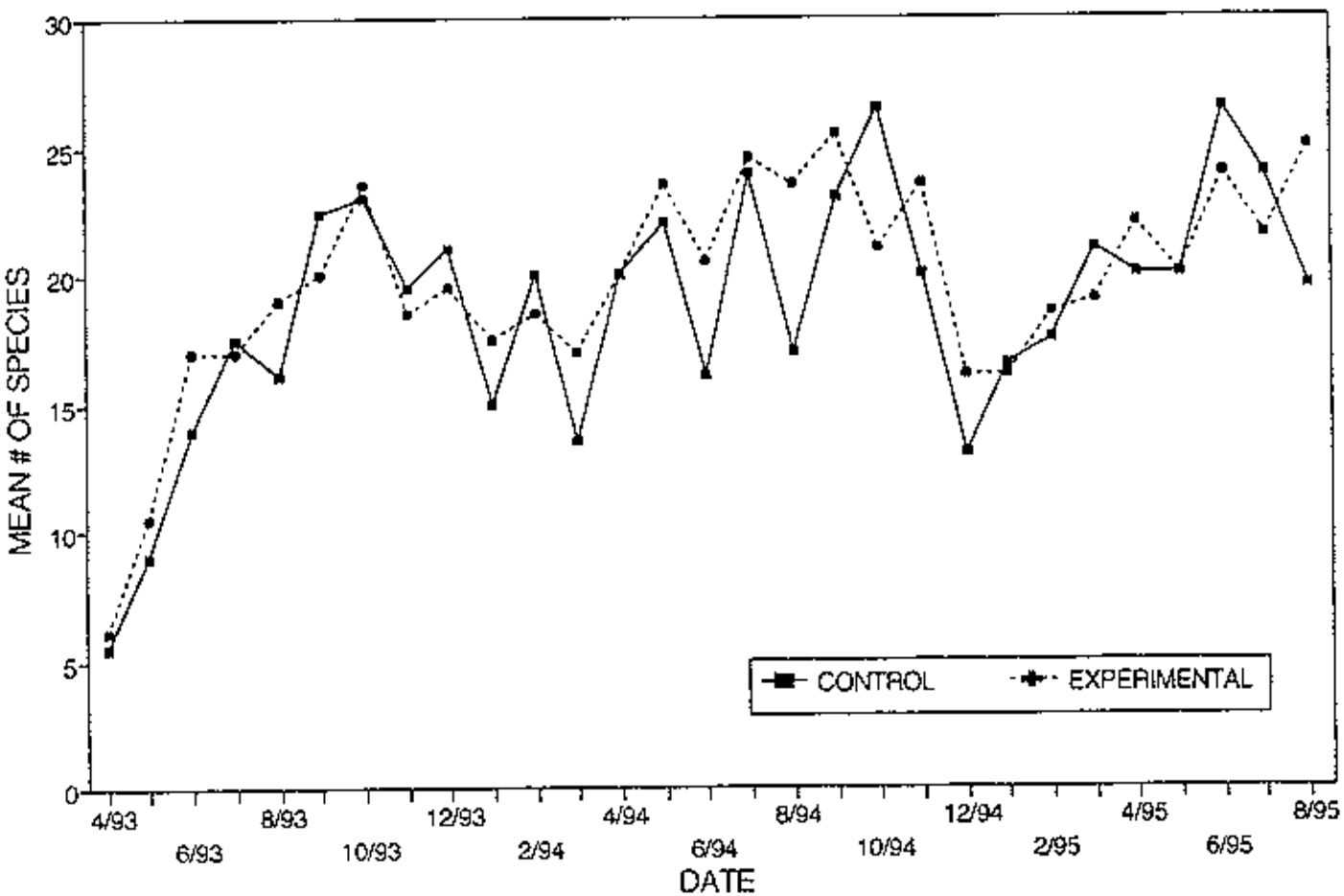

Figure 8: Mean number of species identified on the control and experimental reefs during all three years by date. Replicate reefs have been combined

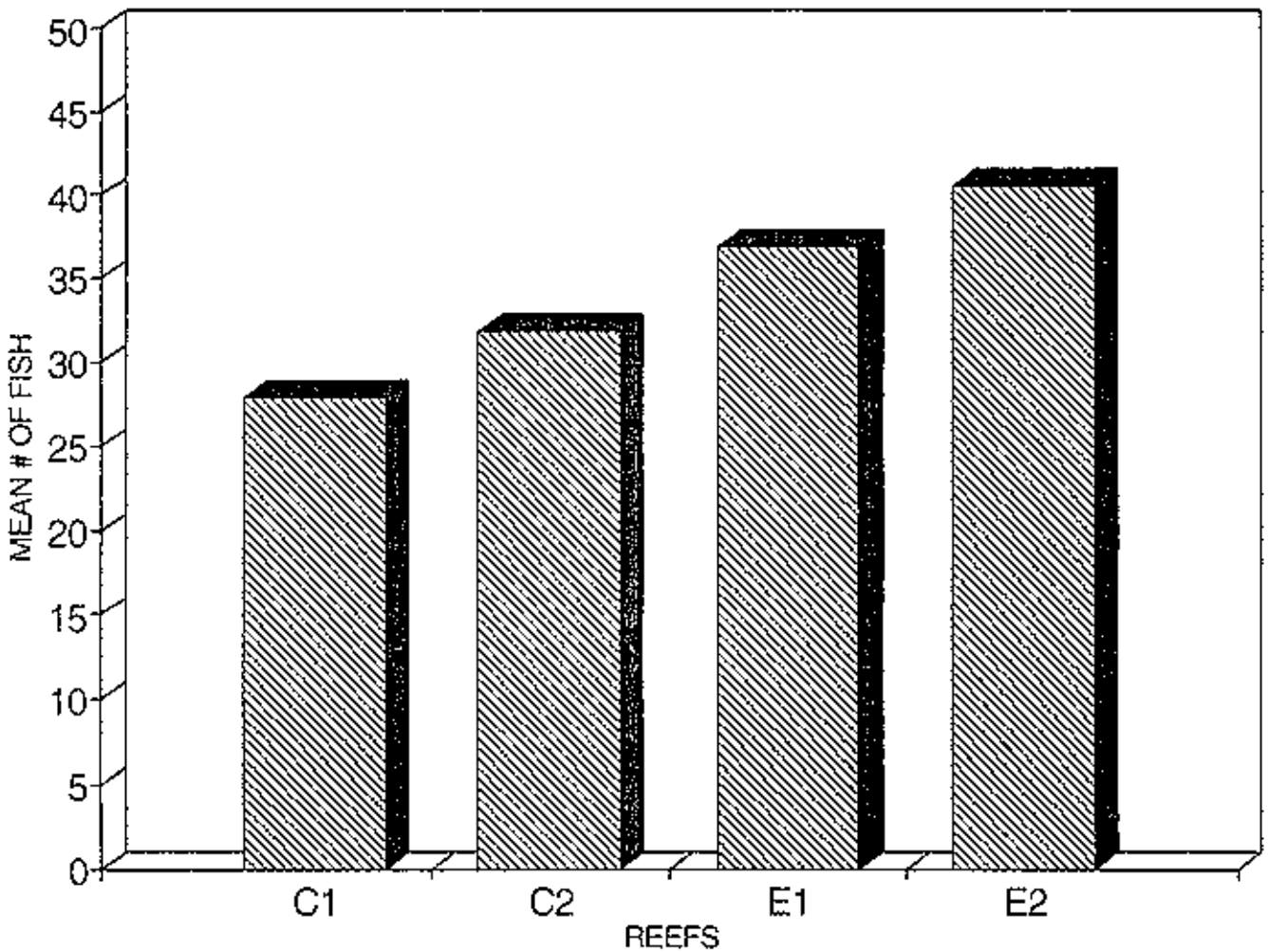

Figure 9: Mean number of fishes counted on each reef during the first year.

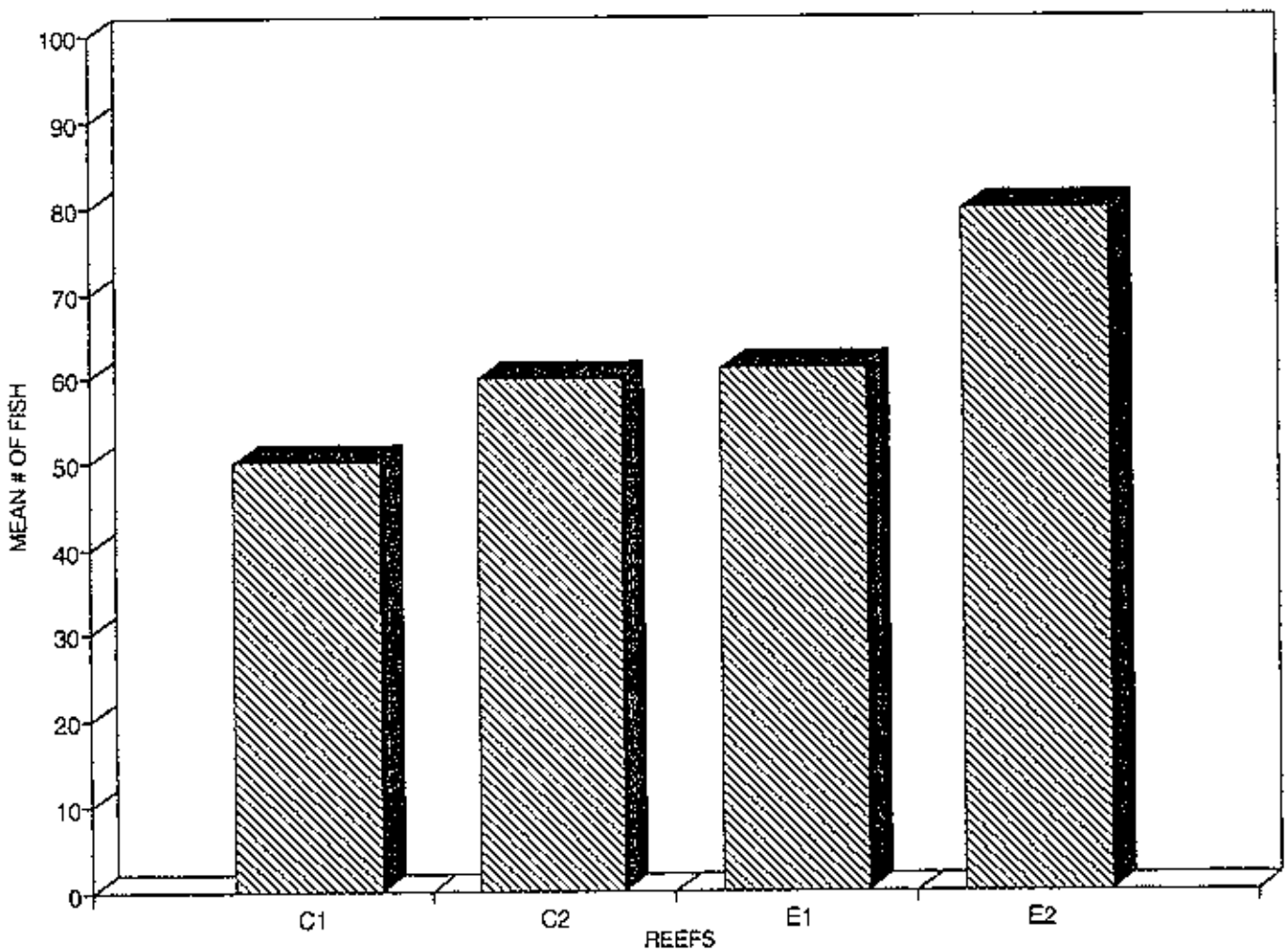

Figure 10: Mean number of fishes counted on each reef during the second year

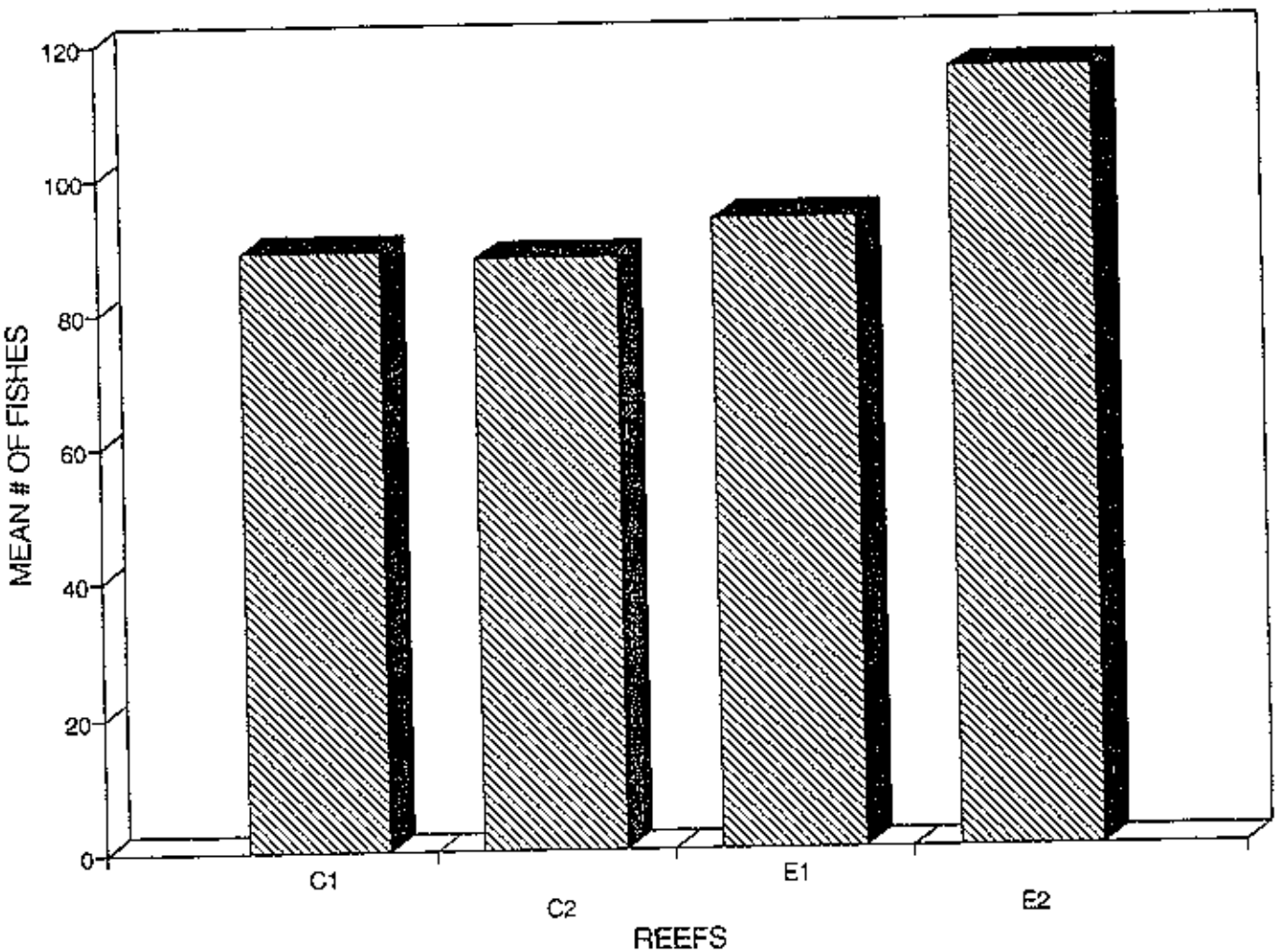

Figure 11: Mean number of fishes counted on each reef during the third year

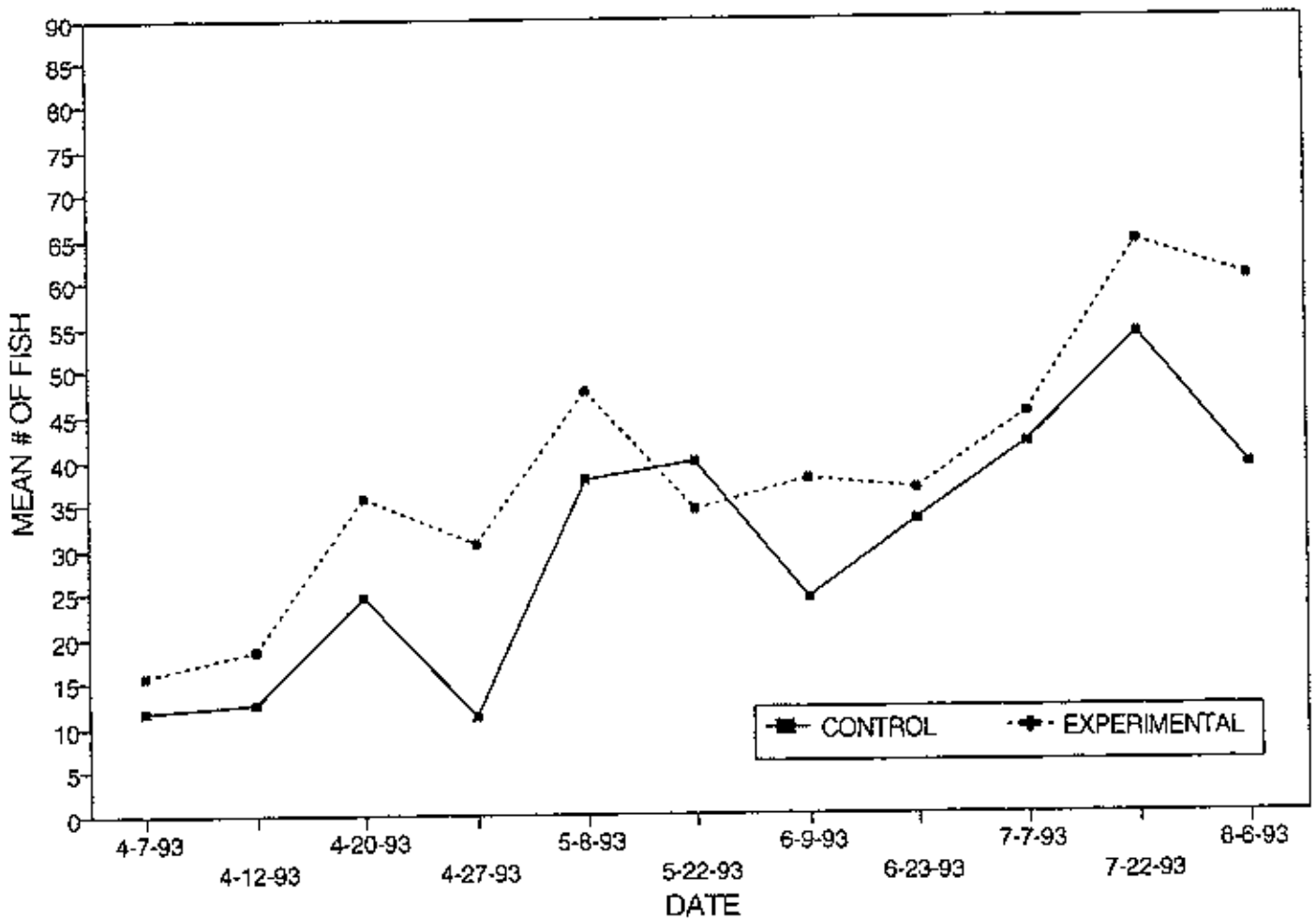

Figure 12: Mean number of fishes (all species combined) counted on the control and experimental reefs during the first year by date. Replicate reefs have been combined.

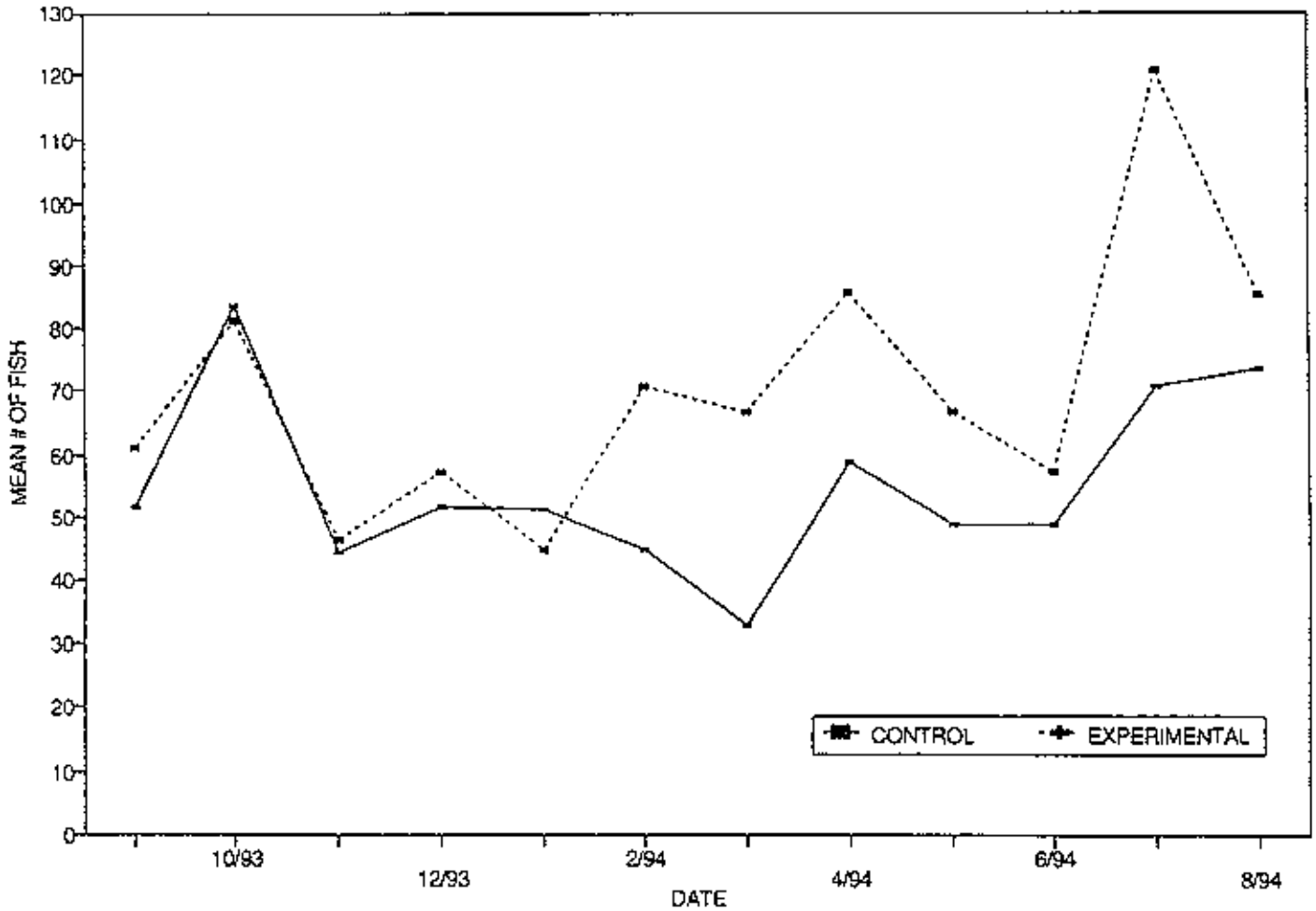

Figure 13: Mean number of fishes (all species combined) counted on the control and experimental reefs during the second year by Replicate reefs have been combined date.

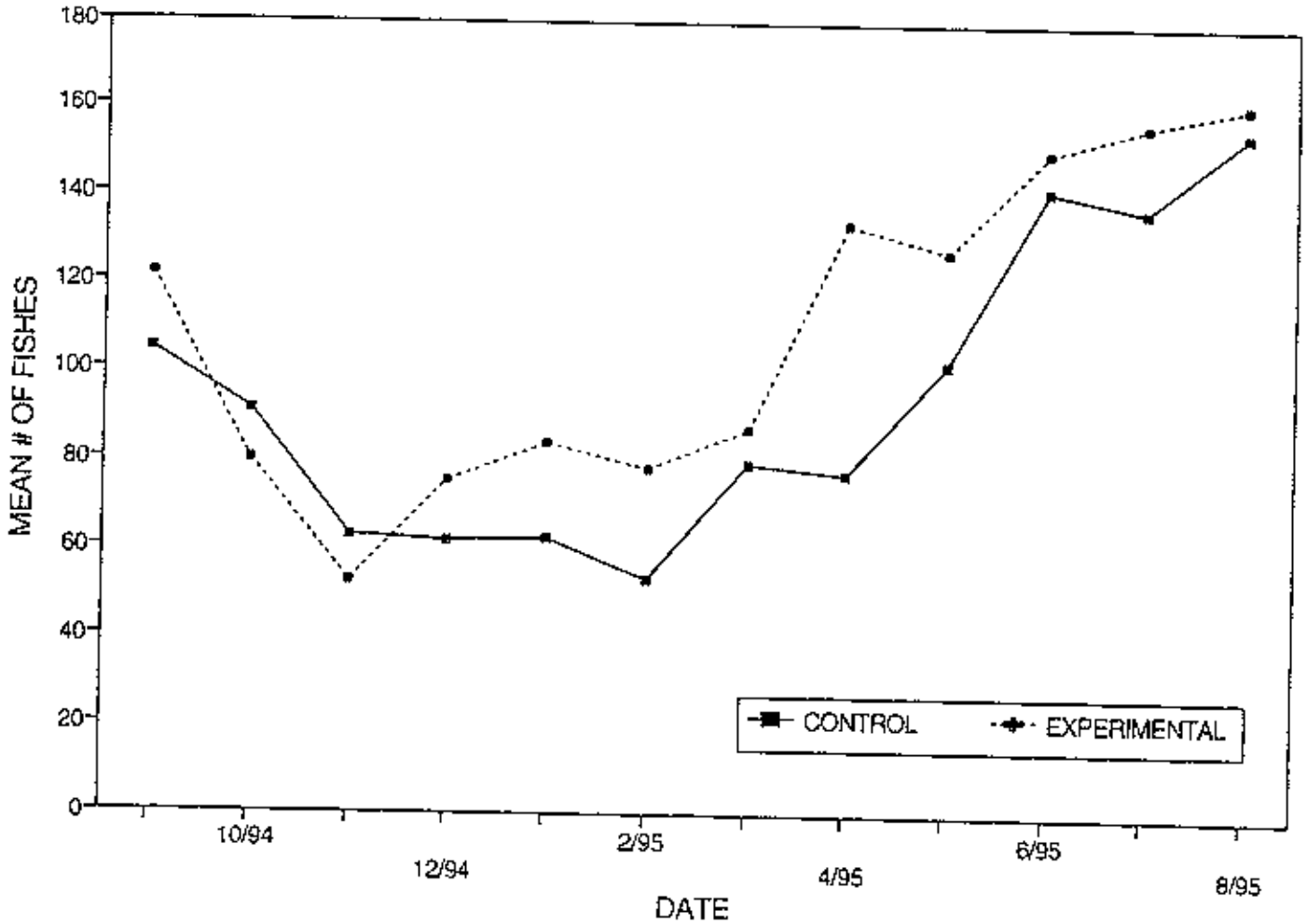

Figure 14: Mean number of fishes (all species combined) counted on the control and experimental reefs during the third year by date. Replicate reefs have been combined.

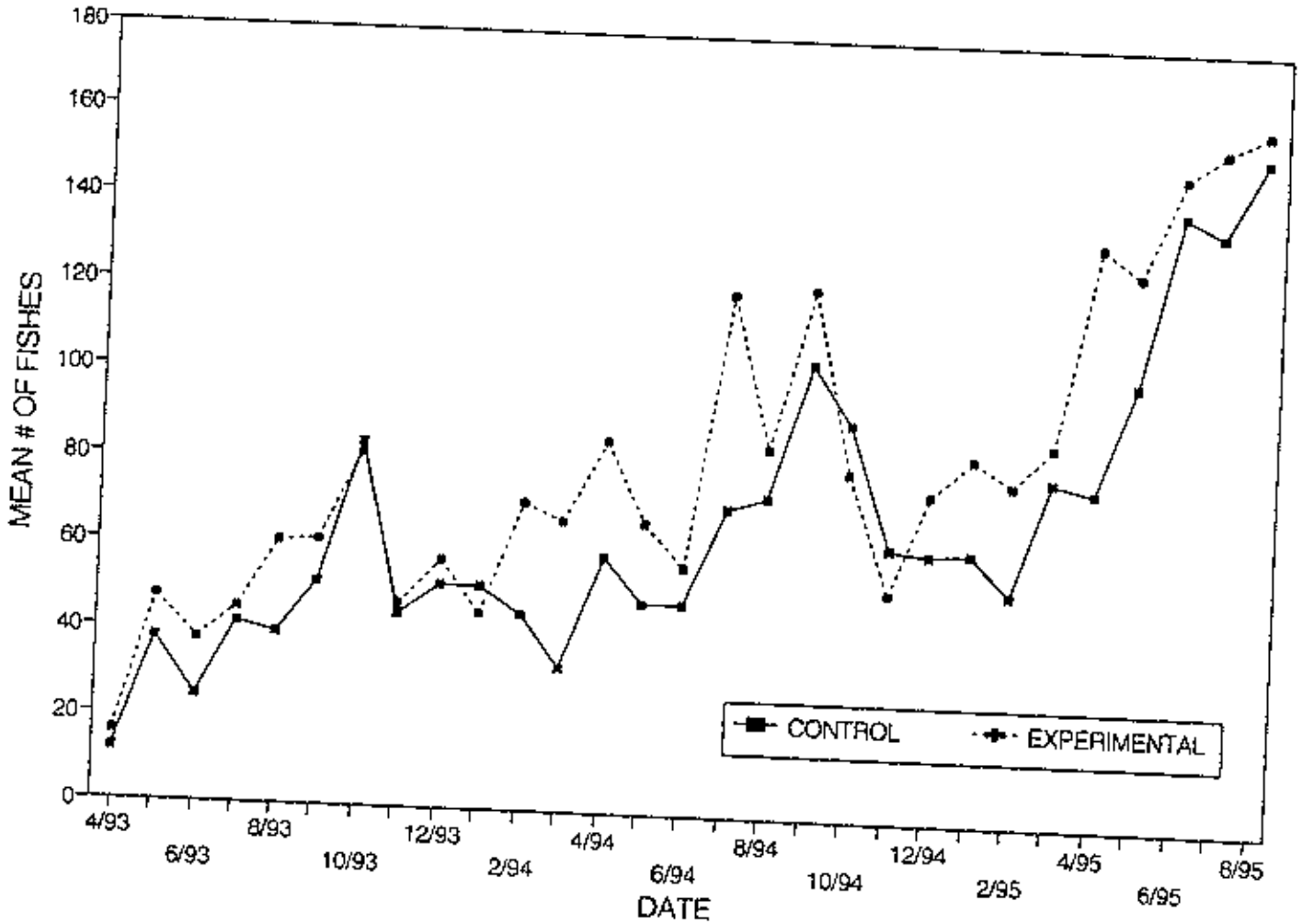

Figure 15: Mean number of fishes (all species combined) counted on the control and experimental reefs during all three year by date. Replicate reefs have been combined